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ON A CHRONIC CHOLERA CARRIER*

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THE case we are about to offer presents not a few points of interest. More especially we are inclined to think it of import as throwing light upon the existence of "cholera carriers," and as demonstrating the probable mode whereby the cholera vibrio is perpetuated from one season to another and becomes transmitted along trade routes. In the second place, it is of serious import in its bearing upon the efficacy of the international quarantine regulations against this disease. Lastly, it throws doubt upon the value of the routine methods that until recently have been employed for rapid diagnosis of the specific organism. We hesitate to ascribe our abnormal results to imperfect technique, or rather would state that the ordinary technique in our hands has, through the presence of certain other organisms, shown itself unable to separate immediately the specific cholera vibrio with certainty and precision. For this, other methods have been found necessary.

HISTORY OF CASE

For the details of the history of the patient we are indebted to the surgeon of the *Royal George*, to Dr. Bailey, of the American Immigration Service at Quebec, and to Dr. Pagé, Medical Superintendent of the Detention Hospital at Quebec. The patient, a Russian, left the village of Micheldorf, in the district of Wlodawsky, in the province of Szedlicki, on October 18th, driving to the city of Wlodawa, and thence travelling by rail for two days to Libau. At Libau he was detained in an immigrant boarding-house, with some thirty other immigrants, for a day and a night; then he went on board a Danish

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ship bound for London. The voyage, according to his statement, occupied eight days, and that without call or stop at any intermediate port. During this voyage he ate only food supplied by the ship and no uncooked vegetables or fruit. He knew of no passengers being sick during the voyage. As is the custom with foreign immigrants traversing England, he arrived at the wharf in London, and was taken by an omnibus to an immigrant boarding-house, where with him were many Russians and immigrants of other nationalities. Here he was detained for seven or eight days. On November 8th, the day of sailing, he was sent by rail to Bristol and embarked upon the *Royal George*. He had been at sea four days, when (November 12th) he was taken ill with severe cramps in the extremities and abdomen, chilly sensations, vomiting, and great thirst. These symptoms were apparently not sufficiently severe for him to call for the ship's doctor, or to arrest the attention of the stewards. On the thirteenth, the symptoms were more marked, with weakness and diarrhoea, symptoms which continued with more or less severity until the ship arrived at Quebec on the seventeenth. Throughout this period, however, the man made no complaint, and it is scarcely necessary to point out that frequent vomiting on ship-board does not attract special attention. The same is true regarding frequent retirement to the lavatories. The man never sought treatment, and when the ship arrived at quarantine about midnight on November 16th, it was with a clean bill of health, and clearance was given without examination.

By an agreement between the United States and the Dominion authorities to save trouble and delay at the numerous frontier points by which immigrants may pass from Canada into the neighbouring republic, the United States maintains an examining staff at Quebec, and there all immigrants destined to United States points and entering by the St. Lawrence are disembarked and undergo medical examination. Regarding this case Dr. Bailey reported to his government: "My attention during primary inspection was drawn to this immigrant's unsteady gait, anxious expression, with pinched nose and cheeks, and lips blue. His temperature at the time was 99.2°, weak, thready pulse of 138, and he complained of abdominal cramps and intense thirst. He said he had been unable during the five preceding days to retain anything in his stomach except a few bits of bread he and his travelling companion had brought with them from their village in Russia, and at times had no control over his bowel movements. At no time during his whole journey had he eaten any uncooked vegetables or fruit, except four apples purchased and eaten unpeeled between Wlodawa and Libau." It is but just to add that the symptoms did

not appear so marked to other expert observers on the ship and at Quebec.

In the three or four hours during which the suspect was at the immigration building at Quebec it was not observed that he had to retire. As soon as possible after Dr. Bailey's diagnosis of the case, all the immigrants were ordered back on board, the suspect, perhaps unnecessarily, being conveyed on a stretcher, and now the ship was sent back to quarantine at Grosse Isle. It was only some two hours after reembarkation that the patient had an evacuation. This was very watery, being little more than bile-stained, discoloured fluid. The patient was now under strict supervision, and the surgeon placed the fluid in two sterilized glass jars, one of which was delivered to the United States authorities for transmission to Washington, and the other forwarded to Dr. Pagé, at Quebec, for transmission to Dr. Adami at Montreal.

On arrival at Grosse Isle early the following morning the patient was able to leave the ship unaided, walking briskly along the gangway and so to the quarantine buildings. His future history may be briefly epitomized. Within two days he was passing normal stools, and from now on till his deportation on May 30th, he had no further attack of a diarrhoeal or choleraic type. In the spring, however, he manifested definite signs of mental aberration. On this account it was that, after his stools had been absolutely negative for a month, he was declared an undesirable, and was transported back to Europe. Lastly, it deserves note that the suspect consistently protested that there had been no cholera known in the district from which he came, and Dr. Montizambert, from official declarations, has been unable to trace the records of any cholera at Libau or within two hundred miles of that port during the last twelve months.

BACTERIOLOGICAL EXAMINATION

In accordance with the recommendations of the International Quarantine Committee, the Canadian regulations regarding cholera are that should a case be detected on board ship the officers and passengers who have been in contact with the case are detained at quarantine, where they are under observation for five days, and if no further cases of the disease show themselves during that period, they are then discharged and permitted to proceed to their destinations. Both on this account, and again for the reason that this was the last voyage of the *Royal George* to Montreal for the year, and because the season was perilously near its close, so that navigation might be interrupted at any moment, it will be seen that it was all important that a

diagnosis be obtained without a moment's delay. Thus the jar containing the faecal fluid was immediately forwarded to Quebec, and on the evening of the seventeenth was sent by express to Montreal, and came into Dr. Adami's hands at mid-day upon November 18th.

The jar contained some 200 c.c. of a thin, dark, greenish fluid, only slightly turbid and with but a small amount of sediment. On centrifugalization with the ordinary hand centrifuge machine the conical end of the tube contained a little over 1 c.c. of greenish deposit, which, on washing with water, swelled to some extent and became pale and mucoid and somewhat stringy, showing under the microscope no evidences of digested food, but occasional cellular débris. At 12.30 p.m., six test tubes of Dunham's medium were seeded both from the supernatant fluid and from the débris and placed in the incubator at 37°C. - Immediately smears were made from the centrifuged sediment and, after fixation, stained by Gram's method, by Loeffler's blue, and by dilute carbol fuchsin. These smears revealed an abundant bacterial flora, the most striking feature of which was the presence of relatively long, thin, Gram-negative, bacillary forms. Every field of the microscope with the immersion lens presented abundant bacteria of this type, many with a double (S) curve, more with the single curve, and, as is common with the cholera vibrio, many straight or with a scarcely recognizable curve. These organisms appeared most clearly and sharply with dilute carbol fuchsin.

At 8.30 the same evening; namely, after eight hours' incubation, the tubes of Dunham's medium were removed from the incubator and examined. Smears were made from drops taken from the surface, and plate cultures were made upon agar and gelatin media, as also streak cultures upon agar. The smears made direct from the broth showed what appeared to be pure cultures of one form, a form, namely, of the same diameter as the vibrios seen in smears from the faeces, in general relatively long, but on the average not so long as those seen in the faeces. Now the majority of the forms tended to be straight; nevertheless, several with double curves were observable. These were always present in little clusters. Hanging drop preparations showed that they were actively motile; further, they were Gram-negative.

Dr. Adami happened to possess at the time only one stock culture of the spirillum cholerae Asiaticæ. This had not been transplanted for some months. An agar tube of this was also filled with Dunham's solution and incubated along with the others as a control. This gave, at the end of eight hours, forms which in size and staining power resembled those obtained on Dunham's tube and in the stools. The only noticeable feature was the relative paucity of the vibrios in the field. The

subsequent history of this is interesting. The agar tubes made from this culture gave apparently no growths and were put to one side. Coming to examine the tubes a month later small colonies were found, and since then have been carried through successive transplantations. The remarkable thing about this attenuated and revivified form is that it presents individual vibrios with a more pronounced curve than we have ever previously met with. In this it is wholly different from the other three strains now in our possession. In all other respects it is typical.

As a result of these first studies, late on the evening of November 18th, a telegram was sent to Dr. Montizambert at Quebec, stating these facts and concluding, "Must provisionally diagnose cholera. Absolute diagnosis to-morrow night."

The examination next day of the agar plates and streak cultures and of the other media further confirmed the diagnosis. The streak cultures on agar showed the translucent, somewhat milky growths characteristic of the cholera spirillum. With twelve and twenty-four hour cultures on ordinary broth, stained by Pitfield's method, characteristic organisms were observed possessing a single polar flagellum. Regarding the presence of forms with a single polar flagellum there could be no doubt. These additional data led Dr. Adami in the afternoon of the nineteenth to telegraph to Dr. Montizambert at Grosse Isle that these properties of the organism forced him to conclude that he had definitely to deal with a case of cholera. All the Dunham tubes tested in forty-eight hours gave well-marked cholera-red reaction.

So far, then, the following positive results had been obtained; namely: 1. Presence of characteristic vibrio forms in the stools. 2. Presence of similar vibrio forms on the surface of Dunham's medium after eight hours' incubation. 3. Presence of forms possessing a single polar flagellum. 4. Active motility on the part of organisms possessing the vibrio type. 5. Gram-negative staining of the organism. 6. Character of growth upon agar-agar. 7. Presence of the cholera-red reaction.

It may be asked whether this collection of data was sufficient to justify a positive diagnosis. Certainly it would have been better to wait another twenty-four or thirty-six hours in order to report upon the nature of the growth of individual colonies on gelatin plates and the nature of the stab cultures on gelatin. It so happens that had the diagnosis been delayed until these had been waited for, this definite diagnosis could not, at that period, have been ventured upon.

As we shall proceed to point out, the gelatin liquefying power of the vibrio was singularly weak, and was only developed to a characteristic

extent by a repeated subculture. Nevertheless, our subsequent studies show that the diagnosis was correct. Here we would note that gelatin plates made from the surface of the eight-hour Dunham tubes gave in thirty-six hours an abundance of finely granular colonies, together with fewer colonies of a similar appearance to the naked eye, but, seen under the lower power, of a more coarsely granular type. Both forms presented the concentric layers noted by other observers and ascribed to commencing peripheral liquefaction: only a few showed at most depression of the surface colonies but without progressive development of a zone of liquefaction. There were no lobate surface colonies, no whetstone deeper colonies. The more coarsely granular, rounded colonies showed this concentric appearance, though not more markedly than did the others. This same want of liquefaction was true with gelatin stab cultures. Variation in liquefying power of different strains of the sp. cholera has been noted by many observers,* as again variation in the appearance of isolated colonies, but we were not prepared to find such deficiency in early growths.

As above indicated, with repeated transfer from colonies of the more coarsely granular type showing the most marked concentric arrangement, we have eventually exalted the liquefying power and have obtained cultures which now, in every respect, conform to typical cholera spirilla.

A litre bottle of drinking water from the water tanks of the *Royal George* gave negative results.

In the meantime, Dr. Vallée was engaged independently at Quebec making periodical examination of the stools of the suspect, which were sent to him regularly from Grosse Isle. Almost from the moment of his return, the patient appeared to be wholly recovered and in excellent health, with well formed stools. But from these stools, by the employment of Dunham's medium, the same motile, slightly curved form continued to be isolated, agreeing in general characters with those originally isolated by Dr. Adami, and, as with Dr. Adami's forms, showing little liquefying power.

Here it deserves note that on the fourth day after the isolation of the patient, his effects were forwarded to Montreal for examination. Those effects were curiously meagre. They were contained in a small, reed hand-basket and consisted of: three small, plain, cotton handkerchiefs; two larger coloured; one small rag; one briar pipe; one bottle of eye medicine with dropper and Russian label, and one small, paper-covered book of evangelical hymns (German). These, according

*See Zlatogoroff's observations given latter.

to an attached label signed by Dr. Pagé, were all the effects with which the suspect landed at Quebec.

One large and one small handkerchief were crumpled and presented clear evidence of use; the others were relatively clean. Three of them were placed separately in sterile flasks, covered each by 150 c.cm. of Dunham's solution, and incubated for eight hours. Two of the flasks remained absolutely clear, with no surface film, and on microscopic examination the films made from the broth were wholly negative, devoid of any growth. The other, which contained the larger, soiled handkerchief, was recognizably more turbid at the end of the eight hours, and drops taken from the surface layer exhibited what, by simple staining, appeared to be a pure culture of an organism identical with that obtained from the stools in the first instance. Nevertheless, gelatin plates from this yielded four varieties of colonies. Two of them gave definitely stumpy bacilli, a third, of more granular type, afforded short, relatively thin bacillary forms, with two, not one, polar flagella. This form died out and could not be further studied. The dominant organisms had characters not distinguishable from those first described as being obtainable from the stools.

In order further to test the nature of these organisms, it became necessary to undertake agglutination tests, and independently Dr. Vallée obtained from Washington, and Dr. Adami, first through the courtesy of Dr. Park, and later direct from the New York Pasteur Institute, received some dessicated, agglutinating serum prepared by the Swiss Serum and Vaccine Institute of Berne, under the direction of the well-known bacteriologists, Professors Kolle and Tavel, and with this both obtained positive results. Here a few words may be said regarding the serum in question. It is prepared by immunizing horses with cholera spirilla until their serum develops such powerful agglutinating properties that it causes clumping even when diluted ten thousand times. It is sent out desiccated in sealed glass tubes, and is an exquisite product. Its only disadvantage is that it loses its power slowly, in the course of a few months becoming relatively insoluble. Thus, for example, the tube which Dr. Park courteously sent to Dr. Adami had been opened previously and was found to give no results with high dilutions, using a known cholera culture as a control, and employing the test tube or macroscopic method. Employing the microscopic method, with less extreme dilutions, similar clumping results were obtained with various cultures from our case and with known cholera spirilla, a strain obtained by Dr. Park from one of the New York cases, and another which Messrs. Parke, Davis and Co. were so good as to send us, coming originally from Krahl's collection.

MACROSCOPIC TEST

Agar growths twenty-two hours old from nine different cultures isolated from the original stools and from the handkerchief above mentioned were now taken along with similar agar growths of the Park, and Parke, Davis strains, and were compared by the macroscopic agglutinating test, dilutions being employed of 250, 500, 1,000, 2,000, 4,000, and 8,000. The cultures, it may be added, were chosen for their dissimilarity in growth on other media, some obviously were not cholera spirilla, others were doubtful, but all, save the stock cultures, had been originally obtained from eight-hour Dunham flasks.

The results were as follows: (See page opposite).

The results are, in the light of later results, not a little interesting. The cultures D8 and D9 were those of the cholera spirillum obtained from Dr. Park and Messrs. Parke, Davis respectively. They gave typical agglutinations, becoming incomplete (in twelve hours) at a dilution of one in eight thousand, although complete in twenty-four hours. D7, obtained from a gelatin tube derived from the stools, which, at the end of a week's growth, showed slight evidences of liquefaction, and which on plates showed spherical, concentric, more coarsely granular colonies, behaved identically. This form now, after repeated subculture, gives typical liquefaction, shows a single polar flagellum, and comports itself generally as a true cholera vibrio. In character it appears more nearly allied to the Parke, Davis than to the Park strain, although showing a faint, but perceptible, difference in the action upon litmus milk after twenty-four hours. While neither turned the milk acid, the colouration of the milk with D7 was fainter than with D8. The relatively high dilution with which D2, D3, D4, D12, and D13 gave precipitation by the macroscopic test has caused us considerable debate as to their nature. Further cultures have shown that while all these forms are actively motile they are not cholera spirilla. They are one and all gas producers and provided with peritrichous flagella. In the early growths, certain individuals were recognized having a faint curvature, although the majority were straight. This is an example of the difficulty in making a perfectly unbiased decision. Undoubtedly certain of the organisms had a faint curve. Indeed, control studies on known bacillary forms show a certain proportion with similar slight curvature. Here the problem was complicated by earlier experience that known strains of the cholera spirilla are, at times, singularly devoid of curve. It must now, we think, be taken as a safe guide and principle in connexion with agglutination work that a given serum will agglutinate different strains of the same species to the same extent, and, if it fails to do this, suspicion must at once

be aroused. Thus, further studies of these dubious forms have shown that, although they are those commonest in plates, they are motile bacilli and not spirilla. In other words, the method of concentration by means of Dunham's solution, while it had preserved the cholera

	$\frac{1}{250}$	$\frac{1}{500}$	$\frac{1}{1000}$	$\frac{1}{2000}$	$\frac{1}{4000}$	$\frac{1}{8000}$
D ₂ ¹	±	±	++	+	+	±
D ₃	++	++	++	+	-	-
D ₄ ²	+	+	+	+	○	○
D ₅ ²	-	-	-	-	○	○
D ₇	++	++	++	++	++	+
D ₈	++	++	++	++	++	+
D ₉	++	++	++	++	++	+
D ₁₀ ²	-	-	-	-	○	○
D ₁₂ ²	++	++	+	+	○	○
D ₁₃ ²	+	+	+	○	○	○
D ₁₄ .	-	-	±	-	-	-

Note I: These numbers, it may be noted, were given to the series by the laboratory assistant, in order that a knowledge of the origin of the growths might not be known to Dr. Adami. It is a coincidence, probably due to close similarity in the agar growths, from which the dilutions were made, that has brought together the stock cultures and the typical *Sp. cholerae Asiatica* from the stools.

Note II: From their dissimilarity to typical cholera cultures, these were selected originally largely as controls, and, as the amount of diluted serum was growing low, they were purposely not employed for the higher dilutions.

spirillum, had also led to a more active proliferation of other forms of organisms that are not specific.

An interesting phenomenon was observed in connexion with one of these forms; namely, D2, and to a slighter extent, D14, a phenomenon usually ascribed to the existence of pro-agglutinoids; namely, whereas there was no agglutination in the dilutions of two hundred and fifty and five hundred, higher dilutions afforded definite precipitation.

Independently Dr. Vallée, studying samples of the stools sent periodically from Grosse Isle, obtained parallel results. The eight-hour cultures on Dunham's broth afforded vibrio forms, but the plates made from Dunham's broth in the main yielded gas-producing organisms of the colon type. We can only conclude that, with an attenuated organism, the vibrios, while multiplying with fair rapidity on Dunham's medium, have, to a large extent, grown faintly at first upon transplantation to other media. Similarly, up to the end of April, eight successive examinations afforded smears giving vibrio forms. The ninth failed to show vibrios in smears made directly from the diluted stools, although cultures on Dunham's medium, like all the previous cultures, afforded forms which by the microscopic method of examination showed agglutination with dilutions of from two to three thousand. The tenth and the eleventh examinations, made in May, gave negative results with Dieudonné's medium (see later), although, even in this last examination, growth was obtainable on the surface of Dunham's medium. Dr. Vallée confirms Dr. Adami in obtaining, as a result of Dunham's concentration method, a dominant growth in subsequent cultures of bacillary forms, motile, Gram-negative, and which do not liquefy gelatin.

Why these forms agglutinate in so high a dilution is an interesting problem. A few years ago Drs. Adami and Chopin isolated from a suspected water an organism of the colon type, which was further studied by Dr. Klotz, and which agglutinated with similar high dilutions of typhoid serum. They suggested then that the existence of this aberrant reaction might be regarded as possibly indicating that the organisms had been derived from human discharges, that, in short, this phenomenon of agglutination with human blood serum to this very high degree indicated at least that the microbes had been accustomed to grow within the human organism. Possibly a similar suggestion can be made in this case. Indeed, we may even go a step further, and suggest that the high agglutinating capacity of these cultures has some relationship to their symbiotic growth in the human body along with the true cholera spirillum; that with this growth they have become, as it were, sensitized.

These facts are deserving of note as indicating that the agglutinating test can only be regarded as final when the form under observation agglutinates to the same limit of dilution as does a known strain. We have thus sought for some surer method of isolating the spirillum, and believe that we have found it in the employment of Dieudonné's medium.* As pointed out by Arens, the cholera vibrio grows best in a strongly alkaline medium. Dieudonné takes equal parts of defibrinated ox-blood and normal KOH solution. The results are a dark, laked, alkaline blood solution which can be sterilized in the steam sterilizer. Thirty parts of this solution are now added to seventy parts of ordinary peptone agar, the latter made neutral to litmus. The mixture is poured on to agar plates, which, in order to solidify, are dried gradually in the incubator at 37°C. or more rapidly by exposure to a temperature of 60°C. The plates are made twenty-four hours before intended use, and the material to be examined is then spread on the surface. On this medium we find that the type B. coli has either a feeble growth or none at all, whereas cholera vibrios proliferate abundantly, forming good colonies in the course of twenty-four hours, and showing a tendency to surface spread in consequence of the semi-solid nature of the medium.

The forms D2, D3, and D4 were derived from the gelatin plates from the original stools, and from the more finely granular colonies. D12 was from a similar colony from the handkerchief. All these it may be recalled had passed through the Dunham tube, gave thinner growths upon agar than are characteristic of B. coli, agglutinated with relatively high dilutions of a cholera serum, and now, what is striking, they also grow upon Dieudonné's medium in twelve to eighteen hours in a manner which is indistinguishable to the naked eye from the cholera spirillum. We present these plates before the Association† just as, we may add, our agglutination results were presented before a meeting of the Lister Laboratory Club at McGill in the early spring.

Happily, smears from these plates are quite characteristic; the strongly alkaline character of the medium serves to accentuate the morphological difference between the true vibrios and these doubtful forms. We cannot, however, but call attention to the existence, in this case, of bacilli which, by all the methods highly recommended for the rapid isolation of the cholera vibrio, possess characters closely resembling those of the true organism. It might easily happen that,

**Centralblatt f. Bakteriol. Abt. I.* Orig. 50, page 107, 1909.

†NOTE: These were demonstrated before the Laboratory Workers' Section of the Association along with a comparative series of preparations of the form isolated from our case of the old laboratory stock culture and the Park and Parke, Davis strains.

depending on these methods in circumstances similar to those of our own case, where a diagnosis is urgent within thirty-six hours, the observer would be led astray. As in our case, morphological characters become the safeguard,—the presence in the stools of definite spirilla, particularly of those with a double curve, the obtaining from early cultures of forms with unmistakable single polar flagella.

The fact that in the last two examinations of Dieudonné's method Dr. Vallée obtained wholly negative results, demonstrates that at last the patient's stools are free, both from the cholera and from these associated germs.

THE PUBLIC HEALTH ASPECTS OF THE CASE

We have, thus far, dwelt upon the bacteriological aspects of the problem, which, in our opinion, present several features of interest. From the point of public health, what is of the greatest significance is the fact that here we deal with a cholera carrier, similar to the now well-known typhoid carriers. These cases, we may point out, are not unknown. The earliest recognition of this existence, if we mistake not, occurred during the great Hamburg epidemic of 1892, when Dunbar, in an examination of several hundred stools of healthy individuals, gained cultures of the characteristic vibrio from six cases. As noted by Professor Connell* in the suspects quarantined in New York in September and October 1910, two were cholera carriers: it is the culture from one of these, isolated by Dr. Park that we have used as control. The careful routine examination of returning Mecca pilgrims at El Tor in Egypt has afforded half a dozen or more cases of cholera carriers. One convalescent afforded the spirilla fifty days after his illness.† Other cases are recorded in the French literature.

The fullest study of these cholera carriers known to us has been by Russian observers. This is summed up in a recent paper by Zlatogoroff‡ who himself, during the epidemic of 1908 and 1909, made periodic examinations of three hundred and twenty-four cholera patients to determine how long the vibrios persisted in the stools. Sixty-nine of these patients died within ten days. Out of the remaining two hundred and fifty-five, no less than fifty-one per cent. gave vibrios on the fourteenth day, five of them as long as the twenty-second day, seven until the twenty-seventh day, two until the thirtieth day, two until the thirty-third, and six for longer

*This JOURNAL April, 1911, p. 333.

†See Ruffer, *Brit. Med. Jl.* 1907: i: 735 and Gotteschlich, *Lancet*, 1905: ii: 549

‡*Centralblatt f. Bakt. Abt. I. Orig.* 58, 1911, 14.

periods, fifty-six being the longest. He quotes Kulescha and two other Russian observers as having demonstrated that, like the typhoid bacilli, the cholera vibrios remain for a long time in the gall-bladder and bile ducts, and confirms the observation by feeding newly born rabbits with virulent cholera cultures. In two cases he obtained the vibrios from the bile at the end of fourteen and twenty-one days, respectively. Though in his longest case the vibrios isolated in the stools on the fifty-sixth day after recovery were morphologically unaltered, in another case vibrios obtained on the thirty-second day exhibited very weak curvature and feeble staining. Often, also, he noted that the growths from these carriers were very weak and soon died out, and though, in general, growths obtained at the beginning of the disease were quite typical in gelatin, those recovered after twenty-one days not infrequently *either liquefied gelatin weakly or not at all*. The indol reaction also became weakened. This is interesting in comparison with our case; on the other hand, most often the vibrios retained their original agglutination power, although in fifteen per cent. there is a definite diminution.

It is thus evident that the existence of cholera carriers is well established. Indeed, we are strongly inclined to attribute to these, rather than to those actually suffering from the disease, the gradual spread of cholera along trade routes. If Zlatogoroff's figures are to be accepted, the indications are that less danger is to be expected from them than from typhoid carriers. As we know, the latter may continue to yield typhoid bacilli over a space of many years. On the other hand, the tendency is that the cholera vibrios in general disappear within two months. Conditions are not always so favourable, however, as indicated by this case, in which a man who gave no history of the disease afforded vibrios twenty-six days after leaving an infected country and continued to pass these spirilla for five months longer. Another important observation of Zlatogoroff's is that while in one case he found no diminution in the virulence of the vibrios isolated from the stools on the fifty-first day, in three others, on the seventeenth, twenty-second, and twenty-fourth days, respectively, the virulence was found reduced from two to three times. The tendency would thus seem to be for the spirilla in these carrier cases to be distinctly weakened, and the variations in their morphological and culture characters confirm this view. We cannot but believe that during the course of the last few years cholera carriers must have repeatedly landed on this continent, but whether through this weakening of the microbes, or through the better hygienic conditions now prevailing in civilized countries, no ill results have ensued. Some day it may happen that an individual

bearing highly virulent vibrios may effect a landing, and then, if, by chance, he passes to some place where his faecal matter can contaminate a water supply, we may find the development of an apparently spontaneous epidemic of cholera. No quarantine regulations, it seems to us, can be devised against such a possibility. Fortunately, the chances of such an event appear to be singularly slight.

"OUR notions as to the place of uric acid in metabolism have undergone profound change in recent years. It is recognized that this substance can no longer be looked upon as an intermediate product in the formation of urea, but that it is a special product of the breaking down of one particular class of protein substances, the nucleo-proteins. A second mode of origin, by synthesis, is perhaps operative, to some extent, in the human body, and must play an important part in birds and reptiles, the bulk of whose nitrogenous excretion is in this form. Obviously this change of view cannot fail to modify profoundly our ideas as to the optimum diet of gouty patients. Our aim will be to avoid adding to the excess of uric acid in the blood, by limiting the intake of its parent substances, the purin bodies and nucleo-proteins. To this end it no longer appears necessary to restrict protein foods generally, unless the kidneys be actually diseased, but rather to restrict such foods as are rich in the constituents referred to; namely, the extractives of meat, the glandular organs, such as sweetbreads and kidneys, and the varieties of meat which are specially fibrous, and therefore rich in nucleo-proteins. Other restrictions which are imposed, and with good cause, are made upon empirical grounds, and mainly on the testimony of those best qualified to judge of their desirability; namely, gouty sufferers themselves."—*The British Medical Journal*.

TYPHOID BACILLUS CARRIERS*

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IT is a fundamental fact that all persons with typhoid fever have been infected either directly or indirectly from individuals who are excreting typhoid bacilli. Such an individual is a typhoid carrier. It is immaterial to the result whether these infecting persons are actively suffering from the disease, have been apparently cured for many years, or have never been known to have had typhoid fever.

In order that a clear conception may be had of what is meant by a typhoid carrier, a classification is evidently necessary. Up to the present time much confusion has existed for want of a uniform classification. The most comprehensive is that suggested by Sacquepèe. It is as follows:

Group I: Precocious carriers,—those carriers in the incubation period of the disease.

Group II: Persons who have recovered from typhoid fever, but who continue to eliminate typhoid bacilli.

Sub-group A: Convalescent carriers,—those who cease eliminating bacilli before the end of the third month.

Sub-group B: Chronic carriers,—those who eliminate bacilli for an indefinite period.

Group III: Paradoxical carriers,—those who have never had symptoms of typhoid fever, but who eliminate bacilli for an indefinite period.

This classification, however, may be condensed for practical purposes into two large groups; namely, temporary and chronic typhoid carriers. The temporary carriers are convalescents who cease eliminating typhoid bacilli before the end of the third month after the onset of the disease; the term "chronic" is applied to carriers who eliminate bacilli for an indefinite period.

For the present, however, I shall adhere to the more com-

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prehensive classification of Sacquep  . The first class is the precocious carriers, or those eliminating the bacilli during the incubation period of the disease. Mayor, in 1903, was the first to isolate typhoid bacilli from the stools of a person who did not develop symptoms until eight days later. Since then a few cases have been reported, but it is quite apparent that such cases should be seldom recognized. However, it is evident that similar cases occur frequently, when statistics regarding contact cases are examined.

Klinger has published a table based on 812 contact infections. In each case the exact period of the disease of the patient from whom the infection was contracted could be accurately determined. The incubation period on the average was sixteen days, or, roughly, two weeks. Of the 812 cases, 183, or 22.5 per cent., contracted the disease from persons in the incubation period, 4.9 per cent. from those in the first week, and 17.6 per cent., from those in the second week. Furthermore, Klinger found that the second week of the incubation period was as dangerous as any time during the active course of the disease. Similar findings were observed on analyzing the cases of typhoid fever in the district of Columbia during 1907. Of the 523 cases recorded, 70, or about 13 per cent., gave a history of contracting the disease by contact, and of these 18, or 26 per cent., contracted the disease from persons in the incubation period of the disease.

The practical importance of such conditions in regard to the public health is readily recognized. On analyzing the cases of typhoid fever in Boston during the year 1909, it was found that of 559 cases occurring during that year, 158, or 28.2 per cent., were imported cases, who became sick shortly after reaching Boston. On examining into the occupations of those not exposed to typhoid fever it is found that the railroad employee and the travelling salesman are 100 per cent. more frequently infected than those of any other adult occupation, even more than physicians and nurses. Another fact is also very significant. Sixty-two per cent. of the cases occurred amongst the well-to-do. Under present conditions the people well enough off to be travelling for their vacations or for other reasons, are more likely to be infected with typhoid fever than the poorest and most ignorant in the city. The danger incurred from such persons travelling from place to place during the incubation period of the disease is hard to estimate. That it is considerable there is no question, and many sporadic epidemics of typhoid fever may have undoubtedly started from such cases.

Before discussing the second group of typhoid carriers, I should like to deal with the elimination of the typhoid bacillus during the course of the disease. On analyzing over three hundred cases in which the stools were examined for typhoid bacilli during the first four weeks of the disease, the following results were obtained:

1st week	26 per cent.	contained	bacilli.
2nd " 37	" "	" "	"
3rd " 40	" "	" "	"
4th " 35	" "	" "	"

From these findings it appears that at all stages of the disease bacilli are eliminated by the faeces, but especially during the third week. Most observers agree that in about 25 per cent. of typhoid cases typhoid bacilli can be demonstrated in the urine, and, as in the feces, especially during defervescence. The character and severity of the infection does not seem to influence in any way the excretion of the bacilli in the discharges, their presence being just as common in extremely mild, or atypical cases, as in the most severe case of typhoid fever. On this account the recognition of every case of typhoid fever is of paramount importance. Many cases of mild typhoid fever are passed over because all possible means of making a proper diagnosis are not employed, and the case is looked upon as a mild febrile upset. Lemoine has had the blood examined in every case of febrile gastro-intestinal disturbances and jaundice in his service during the past three years, and he found the typhoid bacillus in pure culture in 40 per cent. of the cases, although there was nothing at the time or later to suggest typhoid fever. This experience has convinced him that unsuspected abortive or occult forms of typhoid infection are much more common than is generally realized. I have had the opportunity of examining the blood of five mild febrile cases in which the diagnosis of typhoid fever was not considered until the typhoid bacillus was found in the blood.

There is another form of typhoid fever which is particularly liable to be overlooked. Brückner calls attention to three recent epidemics of typhoid fever in different communities in western Germany in which infection was traced to a child who had had a mild gastro-intestinal disturbance, so slight that medical aid was not sought. Several children who played with this child developed, likewise, a mild ambulant and unrecognized form of typhoid fever, but from these children numbers of other cases in adults and chil-

dren developed. Each epidemic might easily have been prevented if the first child, or children, had been seen by a physician, or if the disease had assumed a clinically recognizable form. His experience demonstrates that typhoid is liable to be lurking beneath apparently harmless indigestion.

Rommeler cites a most instructive case, that of an eighteen months old suckling child, whose mother was taken ill with typhoid fever. The child was nursed by its mother for eight days after the onset of her illness and was then taken charge of by a neighbour. On the first day of her custody the foster-mother noticed that the child had a slight diarrhoea, which she attributed to the necessary weaning. Seventeen days later the foster-mother developed typhoid fever. Within the next two months five other members of the household developed typhoid, one of whom died. Six weeks after the slight diarrhoea of the child its stools were positive for typhoid bacilli on two different occasions but negative on nine subsequent examinations. Its serum gave a positive Widal reaction in a dilution of 1 in 100.

This child was evidently infective during its attack of diarrhoea and also for two weeks afterwards, and thus was a temporary carrier, and belongs to Group II, Sub-group A, of Sacquepee's classification. The importance of these convalescent or temporary or transitory carriers cannot be overestimated, especially on account of their frequency. In New York, of 118 cases examined, 11 per cent. were transitory carriers. In Boston, of 65 cases examined, on discharge from the hospital 23 per cent. were still discharging typhoid bacilli. In considering 8,794 cases of typhoid fever, 6·6 per cent. were found to be transitory carriers.

From these statistics it is plain that transitory carriers are comparatively common, and perhaps even more so than is here indicated. The more careful the examination the higher the per cent., as is shown by the report of Semple and Grieg working in India. This is probably the most thorough work published on this phase of typhoid fever. In their work, 86 typhoid convalescents were followed, and bacteriological examinations of the excreta were made daily for six weeks after defervescence. They found that 11·6 per cent. were eliminating bacilli at this time. This is the highest carrier percentage recorded and is probably due to the thoroughness of the work. It is natural to suppose that the longer the time elapsing after the attack of typhoid fever the fewer the number of carriers. This is true; for on analyzing over 13,000 cases of typhoid fever those carriers belonging to

Sub-group B of Group II, or chronic carriers, amount to 3·5 per cent., compared with 6·6 per cent. transitory carriers.

It is chiefly through chronic carriers that localized epidemics of typhoid arise and therefore this class is the most important, for although they are not the most common form of carriers yet they last the longest, and therefore have more opportunities of spreading infection.

Time does not permit to review all the epidemics produced by chronic carriers but a few of the most conspicuous will serve. Dr. Noble has very kindly given me details of an epidemic which occurred in New York City. In 1909 the borough of Manhattan was having an epidemic of typhoid in a certain section which was supplied with milk from one dealer who lived in Camden, N.Y. Suspicion fell upon him and investigations were made. He had had typhoid fever about thirty years previously. Since then different members of his family and his workers had developed typhoid fever as well as many people of the village supplied with his milk; in fact, the disease was so common as to be known as "Camden fever." Examinations of his faeces and urine were made, and the faeces were found to contain almost a pure culture of typhoid bacilli. Repeated examinations up to January, 1911, gave similar results.

Another well-known New York case, which has been reported by Soper, is of interest. In this case the carrier was a cook, who infected 26 persons in seven different families. In the campaign in south-west Germany against typhoid fever, the milk-borne epidemics were traced, in practically every instance, to a carrier employed in the preparation or distribution of the milk. Regarding the relative number of cases of typhoid fever which are due to carriers, Kayser, in an analysis of 505 cases, found that 9·5 per cent. were due to carriers. Of 28 carriers discovered, 11 were known to have caused secondary infections in their neighbourhood. Foster found that 20 per cent. of his 386 cases were attributable to chronic carriers. Frosch found that 4 per cent. of 6,708 cases of typhoid fever were due to carriers, and in another series of infections he found that about 7 per cent. were due to carriers.

In considering these results, it must be borne in mind that the carrier has received credit, or rather discredit, only for those cases infected by him directly, and it must be remembered that the importance of the carrier as a source of infection increases when those cases are considered which received their infection from his victims. The line of infection may be considered as a chain, the first link of which is the carrier himself.

Before leaving this aspect of the question of carriers, a word must be said concerning Group III, or paradoxical carriers. These are individuals who have never had symptoms of typhoid fever, but who eliminate bacilli for an indefinite period. In a collected series of 2,964 apparently healthy individuals who had never had typhoid fever, 0·56 per cent. were found to be eliminating typhoid bacilli in large numbers in the stools or urine. Klinger, in his series of 431 carriers, found that 20 per cent. of the chronic, and 46·4 per cent. of the transitory, carriers gave no history of typhoid fever. It is probable that in these cases the organism is a true saprophyte, as in a milk-borne epidemic reported by Scheller. A high incidence of typhoid fever had existed among persons employed in a certain dairy and among those who consumed the milk from it. Fourteen persons who either worked in the dairy or consumed milk from it were found to be eliminating typhoid bacilli in the stools or urine. One of these, a female employee at the dairy, gave a history of an attack of typhoid fever seventeen years before; the thirteen others had never had typhoid fever and were healthy at the time. The female carrier was discharged from her dairy work and all were required to sterilize their hands before milking. At the end of a month the excreta of the thirteen were examined and found to be free from typhoid bacilli, but the female carrier with the typhoid history was still eliminating bacilli. Scheller concludes that this woman was the true carrier, and that the others were only temporary or intermediate carriers. This might account for temporary carriers, but the chronic carriers are most probably persons who have had slight or unnoticeable symptoms of typhoid fever years before. Many such cases are reported and do not give a history of typhoid until they are found to be carriers, when, generally, in the history there is an account of a mild febrile attack of unknown cause and character, which undoubtedly was typhoid fever.

The pathology of typhoid bacillus carriers is not clear at the present time. From the anatomical standpoint there are two varieties,—the intestinal and the urinal. Some authors claim that there is no such thing as a chronic urinary carrier, although in many early convalescent and transitory cases typhoid bacilli have been found. I should think this rather a sweeping statement, since I have had the opportunity of studying a case of typhoid bacilluria in which the original infection had occurred seven years previously. The pathology of the urinary carriers is not yet complete, but it is clearer than that of the intestinal variety. It is a

well-known fact that about 25 per cent. of all cases of typhoid fever afford typhoid bacilli during the course of the disease, and in the majority of these they persist well into convalescence. This bacilluria is always accompanied by a slight pyuria indicating some degree of pyelitis. It is known that an inflamed renal pelvis is the main dépôt of the typhoid bacillus in typhoid carriers, and this condition may or may not be associated with an inflamed bladder, which may act as a secondary dépôt.

As yet we have no definite information concerning the exact pathology of intestinal carriers, but the concensus of opinion is to hold the liver and the bile passages accountable. In the majority, perhaps always, typhoid bacilli are present in the gall-bladder during an attack, and indeed may persist after an attack for an indefinite period. Furthermore, Pratt has collected five cases in which typhoid bacilli were found in the gall-bladder as a local infection without the patient ever having had typhoid fever. But the possibility of a mild attack which has not been recognized has always to be remembered.

The relation of gall stones to the typhoid carrier state is most interesting. Foster, in 1908, first directed attention to the association of gall-bladder troubles with typhoid carriers. Naturally symptoms of gall-bladder disturbance are more common in chronic than among transitory carriers. About 13·6 per cent. of chronic carriers give a positive diagnosis of gall stones. Females are much more prone to cholelithiasis than are males, and the sex ratio in chronic carriers is five females to one male, which closely corresponds to the ratio of gall stone incidence in the female to that in the male, which is about five to one.

Much theory and very little fact is advanced to explain the carrier state. Various workers suggest that it may be due to tight corsets, frequent pregnancies, overwork, menstrual and puerperal blood losses, etc. But it must be remembered that the gall-bladder and gall stones are not the only site of bacilli in chronic, intestinal, typhoid carriers. At autopsy of carriers typhoid bacilli have been recovered from the liver, walls of the gall-bladder, and from the large bile ducts.

The diagnosis of typhoid carriers depends upon the Widal reaction and the bacteriological examination. In many persons who have had typhoid fever, a positive Widal reaction is obtainable for many years, even though they are not carriers, and a small percentage of carriers do not give agglutination in sufficiently high dilutions. However, it may be stated that about 75 per cent.

of all carriers give a Widal reaction in a dilution of the blood serum of 1 to 100. This method may be used as a preliminary step where carriers are being looked for, but the final means of diagnosis is the isolation of the typhoid bacilli from the urine and faeces. Special care should be given to the bacteriological examinations in cases giving a positive Widal reaction.

The method of isolation of the organism from the urine is a comparatively simple matter, while from the faeces it is much more difficult. Time does not permit of an outline of the methods and media suitable, although a list of the latter may be mentioned. The chief ones are: 1. Bile-salt-neutral-red-agar. 2. Lactose-litmus-neutral-crystal-violet-agar. 3. Lactose-fuchsin-sodium-sulphate-agar. 4. Preliminary enrichment by caffeine before plating on No. 2. 5. Media containing malachite green, of which there are five modifications. The success of the isolation of the typhoid bacillus does not depend so much upon the medium used as upon the experience of the worker with a special variety, although the best results have been obtained by the use of malachite green as an enriching medium and plating on No. 2 or No. 3.

The treatment of intestinal chronic carriers has been most unsatisfactory. Spontaneous cures have been reported, but must be accepted with great caution, as a carrier may cease excreting bacilli for a year or more and then recommence. Many drugs have been tried and found wanting. Lactic acid bacilli have been given with no results. Surgical measures directed to the gall-bladder, either removal or drainage, have been by no means encouraging. When the possible wide distribution of the bacilli in the biliary tract is recalled, the difficulty of the situation is at once apparent. Typhoid vaccines have been used by some workers, and seem to give the best results up to date. Meacler, Irwin and Hauston, and Stone have had very good results from these.

In regard to the treatment of urinary carriers, urotropin has not proved so efficacious in the treatment of the bacilluria of carriers as in the treatment of the bacilluria of convalescents. This may be explained by the fact that in chronic carriers the wall of the pelvis has been deeply invaded and is not acted upon as readily by the drug. It is found, however, that the administration of urotropin does diminish the number of the organisms while it is being administered, but they rapidly return when it is suspended. Treatment by homologous vaccine has met with most brilliant and permanent success in some cases, and should be given an exhaustive and thorough trial, as it is the only method known at present which has a permanent effect.

In view of the frequency of typhoid carriers, the difficulty of cure, and the great danger they are to the public health, every means should be employed for their recognition, prevention, and isolation. The task of recognition of transitory carriers falls to our general hospitals, where over 50 per cent. of the cases of typhoid fever are treated. Every case, before discharge, should be thoroughly examined bacteriologically, and should be kept in the hospital or under strict observation and be treated by homologous vaccines until the excreta are free of typhoid bacilli beyond peradventure. Madsen particularly emphasizes the importance of keeping typhoid patients in the hospital until they are entirely free from bacilli. He also states that if they could be re-examined six to twelve months afterwards, especially the adult women patients, much would be gained. He urges search for the source of infection in every case of typhoid fever, and that the district physician should be informed when a known carrier is in his jurisdiction, so that he can keep him under supervision. Those cases which are not treated in the hospitals should be strictly watched and frequently examined by a special department of the Board of Health. These precautions are all the more imperative in this country, where typhoid fever is so common and leads to so many disastrous epidemics.

Germany has dealt with this question in a masterful way. In the south-western part of the empire typhoid fever is largely endemic. On the recommendation of Koch, stations were established in this district under the municipal government. Each laboratory was well supplied with skilled bacteriologists, who worked in conjunction with the local authorities. Their duties were fourfold,—to diagnose typhoid fever, to ascertain the source of infection in each case and to examine for infected persons, to supervise and regulate the general hygiene of the district, and to make bacteriological examinations of stools and urine, in order to determine when convalescents cease eliminating typhoid bacilli. By their work they have made great strides in the prevention of typhoid fever, more especially as regards the typhoid carrier. As there is no other source for malarial infection than mankind, so it is with typhoid fever, which practically means that if we can prevent, cure, or render innocuous the typhoid carrier, we can get rid of typhoid fever, but not until this has been accomplished.

INFANTILE MORTALITY IN CANADA

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THIS short and incomplete paper is a brief résumé of the information contained in the Census Report of 1901 and the last reports of the provinces of Ontario and Quebec in regard to vital statistics; and comparisons are made with the returns of other countries. The figures contained in the census of 1901 are the last obtainable which permit of any provincial comparisons being made, the collection of vital statistics by the several provinces not being in that uniform condition their importance demands. Indeed, in this matter it might be stated there is room for great improvement, the subject being of national importance, the systematic collection and tabulation of births, marriages, and deaths affording the means for the study of many health problems, as well as serving many other useful purposes.

The national importance of a careful consideration of infant mortality has been brought to the notice of sanitarians and the public during the past few years, and we have, fortunately, much valuable information upon the subject, chiefly derived from the older and more densely populated countries where all those varying conditions of environment consequent upon density, occupation, and poverty, have most important bearings upon the lives of the infants; conditions, as we often pride ourselves, which either do not exist in this country, or, if they do exist, are so slight as not to be worthy of consideration.

The registrar general of England and Wales in a study of this subject has made many interesting comparisons in his annual report; and Dr. T. H. C. Stevenson, in the seventy-first annual report (1903), states that, "during the greater part of twenty-eight years, (1881-1908), there has been no fall in the rate of infantile mortality in England and Wales." In that country, from 1881-1899 the rate was slightly on the ascendant, but since 1899 the rise has been compensated for by a considerable fall,—a fall due possibly to the quickening of the public conscience upon the subject,—a feature also noticeable in the returns of Prussia, Norway, and Denmark.

The following figures (Table 1) may be taken as representing the reckless and wanton destruction of infant life which prevails

in different countries, the figures being for the year 1908, with the exception of France, which is for 1907.

TABLE I
INFANTILE MORTALITY
DEATHS OF CHILDREN UNDER 1 YEAR TO 1,000 BIRTHS
1908

Foreign Countries			
Chili	320	Netherlands.....	125
Hungary.....	199	Denmark.....	123
Prussia.....	173	Scotland.....	121
Bulgaria.....	170	England and Wales.....	120
Servia	158	Switzerland.....	108
Japan	157	Ireland.....	92
Italy	153	Sweden.....	85
Belgium	147	Norway.....	76
France (1907).....	135		

A comparison of some of the British colonies is shown in Table II, the figures for the provinces of Ontario and Quebec being included.

TABLE II
INFANTILE MORTALITY
DEATHS OF CHILDREN UNDER 1 YEAR TO 1,000 BIRTHS
1908

British Colonies			
Ceylon.....	183	Western Australia.....	85
Jamaica.....	175	New South Wales.....	76
Quebec (1906).....	128	Tasmania.....	75
Ontario	124	Queensland.....	70
Canada (1901).....	120	S. Australia.....	70
Victoria.....	86	New Zealand.....	68

It will be seen that in Great Britain the infant death rate is lower than in most of the other continental countries, and that for all practical purposes the death rate in Canada for the census year 1901 was the same as that of England and Wales; namely, 120.

Without further analyzing the figures or making comparisons,

at the outset one is forced to ask the question, why should the mortality of infants be as high in Canada as in England and Wales, and higher than in the Australian dominions? And having asked the question, it may not be out of place to inquire briefly into the subject: what are the chief factors at work, and which may be prevented?

The diseases from which infants die, while various, are not so numerous as those causing death in later years, and are fewer than those operative in adult life. The experience in England, where the subject has received much consideration, shows that prematurity and atrophy together cause more than 30 per cent. of the total deaths, this number representing what may be termed the "unfits." They have survived the intra-uterine period of life, but find the extra-uterine conditions too severe for their separate existence. In the words of Newman, "They are not so much diseased as merely unfit, and either not ready or not equipped for a separate existence." It is quite probable that more of such infants are to be found among people of the poorer classes than among those of the well-to-do; those where the environment of the mother and child is such as, under ordinary conditions would tend to favour life rather than cause or produce premature death.

Next in importance as a factor in infant mortality is epidemic diarrhoea (enteritis). Where comparisons have been made as to the effect of poor housing conditions, it has been found that, while the infant mortality rate was 30 or 40 per thousand births, in those living under better circumstances it was only 10 or 12 per thousand. As showing the high mortality caused by this acute infective disease, it may be noted that in England and Wales, 75 per cent. of the total deaths registered therefrom occur in infants under one year of age; in London and other large cities it is slightly higher.

It is not the purport of this paper to discuss the aetiology of this disease,—whether it is due to *bacillus coli* or any other known or unknown microorganisms, or to their combined action. Ballard has laid it down that three causal agents have to be considered; namely, the soil, the season, the food. And Dr. Newsholme's conclusions are that the fundamental conditions favouring it are an unclean soil, the particulate poison from which infects the air and is swallowed, most commonly with food, especially milk. He has laid down the following dicta, which cannot be impressed too strongly upon the medical profession of Canada:

- "(1) Epidemic diarrhoea is chiefly a disease of urban life.
- (2) Epidemic diarrhoea as a fatal disease, is a disease of the artisan,

and still more of the lower labouring classes, to a preponderant extent. This is probably largely a question of social status *per se*; that is, it is due to neglect of infants, uncleanly storage of food, industrial occupation of mothers, etc. (3) Towns which have adopted the water-carriage system of sewerage have, as a rule, much less diarrhoea than those retaining other methods of removal of excrement. (4) Towns with the most perfect scavenging arrangements, including the methods of removal of house refuse, have the least epidemic diarrhoea. It has recently been suggested that epidemic diarrhoea is due to surface pollution derived from street dust, particularly dried horse manure (Waldo). (5) The influence of the soil is a decided one. Where the dwelling-houses of a place have as their foundation solid rock, with little or no superincumbent loose material, the diarrhoeal mortality is, notwithstanding many other unfavourable conditions and surroundings, low. On the other hand, a loose soil is a soil on which diarrhoeal mortality is apt to be high (Ballard). The pollution of soil is probably the important element in the causation of diarrhoea in towns on previous soils. (6) Given two towns equally placed so far as social and sanitary conditions are concerned, their relative diarrhoea mortality is proportional to the height of the temperature, and the deficiency of the rainfall in each town, particularly of the third quarter of the year."

As to how far these conclusions are applicable to Canada, it remains for those who have the opportunity for research in this particularly interesting field of medicine to make careful enquiry. Certainly, it would appear from a cursory glance at the subject that Dr. Newsholme's conclusions would, in the main, be substantiated. It must be remembered, however, that poverty is not so important a factor with us.

Again, referring to the Table of Causes of Deaths of Infants of the census of 1901, we find that the next most frequent causes of death are found in the groups, Simple Meningitis and Convulsions. The former term may be considered as a generic one including pachymeningitis, leptomeningitis, and any or all the various forms of inflammation of the meninges, whether cerebral, bulbar, or spinal, due either to tubercle or other infectious organisms, or of other origin. And as convulsions in the infant may be a symptom of many of these conditions as well as of others, it is perfectly safe to class them in one group; although convulsions proper, when occurring in infants, may be epileptic in character and indicate some conditions of disease of the brain. Or again, the convulsive seizures may be simply idiopathic or reflex. It

would perhaps be better to classify them under the head of diseases of the nervous system.

Under the group, Diseases of the Respiratory System, we find nearly as many deaths as in the previous group, nearly one-half being due to pneumonia. Tuberculosis (of all forms) may properly be placed in a class by itself. Although a communicable disease due to a specific cause, its points of attack are so many, and there are such numerous forms of it, that it would be very unwise and improper to classify it with the acute infectious diseases. The most prominent of these in their destruction of infant life are whooping cough, diphtheria, influenza, measles, and scarlet fever.

The last in the table is that of inanition, as stated in the census returns, "starvation, due to want of breast milk"; and from this want of nature's food, no less than 323 babies died. The reasons for this great loss would be interesting reading if the true facts could be obtained.

A comparison of the infant mortality in some of the Canadian cities with other cities of the world is made in diagram No. 1. It will be observed that the death rates for Toronto, Hamilton, and London, are virtually the same as that of the largest city in the world; while Ottawa, the capital, with its population of seventy-five thousand, ranks ahead of Madrid, Buenos Ayres, and Rome.

Ottawa is bad enough, but in Montreal the excess is out of all proportion, and I would ask, What is Montreal doing to stop this slaughter? Has the corporation made any move to provide better housing accommodation, to stop the overcrowding now existing, to provide for municipal collection and distribution of pure milk? What is it doing to instruct the mothers and fathers how and what to do to save their babies? Is it satisfied with a high birth rate and a high infant mortality, the mothers simply having babies with travail to mourn their loss before the infant tongue can lisp their name. And yet we live in the enlightened, twentieth, Christian century!

It has not been possible to secure accurate figures for all of the Canadian cities, but in diagram No. 2 are shown the statistics for the decade 1899-1908 (inclusive) for four Ontario cities; namely, Toronto, Hamilton, London, and Ottawa. From the figures given and the comparisons made, it is quite evident that in Canada the infantile mortality rate is not what it should be. It is much too high for a country so sparsely populated, where poverty in its severe forms is non-existent, and the figures quoted carry the conviction that there is a wanton destruction of this item of our national resources.

Why should the general, infant death rate be so high when we have not the many social and sanitary problems staring us in the face as have the nations of Europe, and even, the United States? Poverty we have, but not to the same alarming extent; unsanitary housing conditions are to be met with, but are not so assertive; overcrowding does exist, but the effects are as yet not so apparent. Our cities are, on the whole, healthy; drainage is good, although in regard to water supplies and sewage disposal we have yet much to do. Our milk supplies are only fair; that there is room for improvement is shown by the movement being made for "pure milk." Our people, as a race, are fairly healthy; and our climate is looked upon as that best suited for an active, vigorous manhood and womanhood.

Where, then, are we at fault, for the babies die, die before their time, and the number of deaths is not diminishing as it should? Why this slaughter of our own kith and kin, while so anxious to build up a nation by importing at considerable cost many from the lower grades of European civilization?

That the trouble begins in the antenatal period of infant life, is quite apparent; that the slaughter of the innocents continues from birth onward, is in evidence; and that much of this wanton destruction could be prevented, is more than certain. In civil law, ignorance is no excuse; how much greater then is the sin of the parents when it must be pleaded that they were ignorant of their duties and responsibilities to their offspring, with the result that the little ones died prematurely! But we may go further and say that there are partners in the crime, for in many instances crime it is. In the case of the man born blind it was asked, "Did this man sin, or his parents?" In this case the sin is ours,—yours and mine; as individuals or as a nation we cannot shirk the responsibility for we have not done our duty by the "innocents." Ignorance of parental duties is a great and growing evil, one which must be met by a better and broader education in all that relates to the child and child life. Young women must be taught the duties of motherhood; young men, the responsibilities of fatherhood; the municipality, the duties it owes to the child in providing for clean housing as well as for proper housing accommodation, pure milk supplies, and, by civil enactment, seeing that the environment of the mother and child shall be of the best. The state, too, must move along lines which it has already done to improve live stock, to foster our agricultural wealth, spending money for the purpose. We have the precedent of millions being spent for the upbuilding

of a nation by importation of human stock, but what have we done to conserve the lives of our first asset?

In the making of a nation there are two sources upon which to depend for our population; the one is extrinsic, the other is intrinsic; they are both of national importance. We in Canada have for many years past, recognized the national and provincial necessity for spending enormous sums of money annually to increase our numbers from foreign sources, without considering the conservation of our own flesh and blood. We have been feeding the barrel at the bung at considerable cost, often with elements of a very questionable character as far as their importance is concerned as nation makers, while all the time the spigot has been out and the tap has been leaking, the lives of thousands of our infant population being ruthlessly and wantonly permitted to perish annually without any concerted action being taken to prevent this national waste. For a country like Canada it can only be called a national crime which, to be dealt with effectually, must receive the serious attention of our governments and in the same business-like manner as has immigration.

The migration of so many thousands of infants to premature graves is a subject of sufficient importance to cause us to stop and consider, particularly as our mortality is high, much higher than that of other portions of the British dominions and in excess of many European countries having a much denser population. I have been led to present this subject at the present time, not only from its importance as a national question, but as one of considerable interest locally, for Montreal's infantile mortality rate is so high as to demand more than local attention.

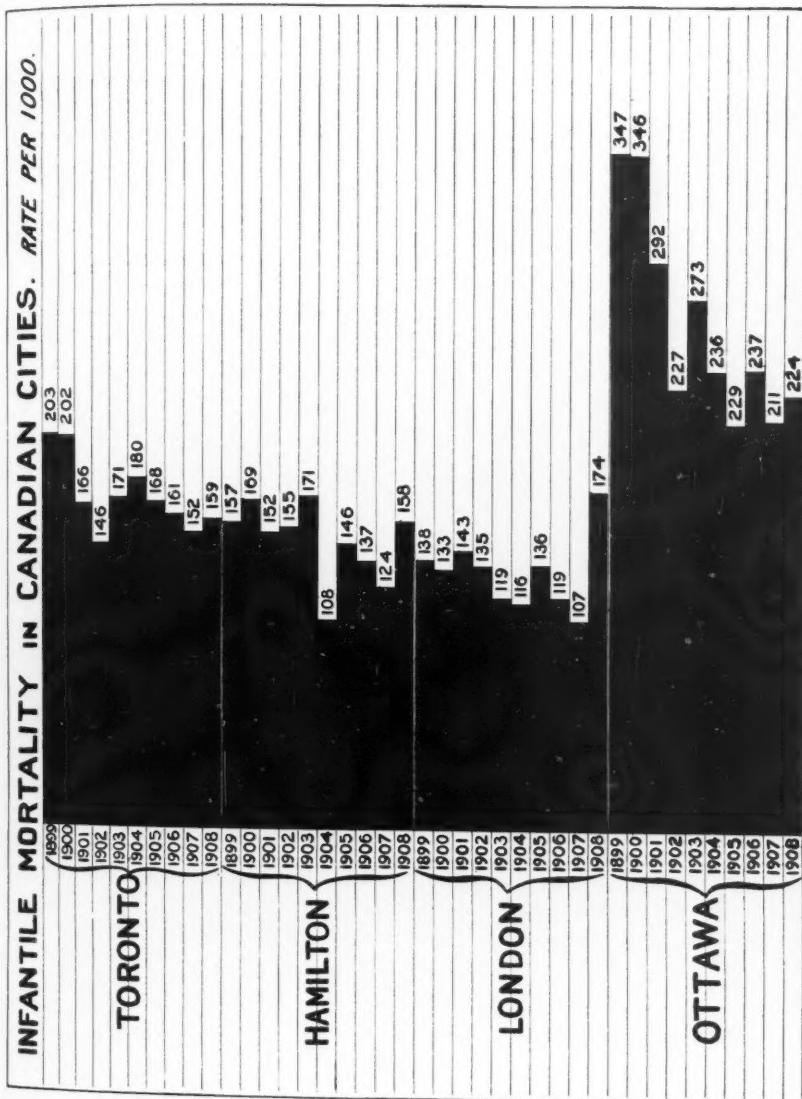
PRINCIPAL CAUSES OF DEATHS OF INFANTS CANADA, 1901

- Congenital debility, 6,388.
- Diarrhoea, including cholera morbus, dysentery, epidemic dysentery, 5,477.
- Diseases of the nervous system (simple meningitis, 1,277; convulsions, 1,101), 2,378.
- Diseases of the respiratory system (pneumonia, 1,001; acute bronchitis, 584; broncho-pneumonia, 359; congestion and apoplexy of the lungs, 312), 2,256.
- Acute infectious diseases (whooping cough, 678; diphtheria, 677; influenza, 460; measles, 334; scarlet fever, 159), 2,308.
- Tuberculosis of all forms, 564.
- Inanition (want of breast milk), 323.

INFANTILE MORTALITY 1908
IN TEN FOREIGN AND FIVE CANADIAN CITIES
RATE PER 1000

PARIS	116	158
HAMILTON		159
TORONTO		173
LONDON CANADA		184
ROME		209
BUENOS AYRES		218
MADRID		224
OTTAWA		225
LONDON		226
NEW YORK		257
VIENNA		272
LIVERPOOL		281
ST.PETERSBURG		285
BERLIN		
MONTRÉAL		375

No. 1.—To Illustrate Dr. Hodgett's article: "Infantile Mortality in Canada."



No. 2.—To Illustrate Dr. Hodgett's article: "Infantile Mortality in Canada."

TYPHOID FEVER AT OTTAWA

JANUARY 1ST—MARCH 18TH, 1911

BY MAJOR LORNE DRUM, M.D., D.P.H.

Permanent Army Medical Corps; Officer in charge Central Military Laboratory of Hygiene, Ottawa

TYPHOID fever has been almost a constant factor in the monthly mortality returns of the city of Ottawa for several years past, but at no period, up to the end of 1910, was there any marked increase in the number of deaths reported. During the past ten years, 1901-1910, 200 deaths have been reported, and of these 38 died in 1907 and 6 in 1903, the years of greatest and least mortality from the disease. The average was 20 deaths a year. In 1910 the mortality was 24. Up to March 18th, 1911, the date at which the investigation closed, in a period of eleven weeks there were 52 deaths for 1911.

The incidence of this disease during the past ten years cannot be ascertained owing to the obvious incompleteness of the official returns. For instance, in the year 1909, only 58 cases were reported, while 23 deaths were recorded. In 1910, 80 cases were reported with 24 deaths. Obviously this mortality is incredibly high for the number of cases, and one is justified in concluding that during these years and the preceding ones, many cases of typhoid fever have occurred in the city unreported, and that the totals of 58 cases for 1909 and of 80 for 1910 are considerably below the real numbers.

Taking these figures as they are, however, we find that in 1910, the monthly incidence was as follows: January, 5; February, 9; March, 14; April, 1; May, 1; June, 1; July, 1; August, 13; September, 7; October, 5; November, 18; December, 5; total, 80. During the investigation a few more cases (5) were found to have occurred in December, making a total for this month of 10, distributed as follows: one on the first, one on the third, two on the fifteenth, one on the sixteenth, one on the twenty-second, two on the twenty-third, one on the twenty-fourth, and one on the twenty-eighth. The incidence of typhoid in this month, therefore, showed nothing unusual compared with previous months. On January 1st, however, the incidence of typhoid increased

abnormally and remained so for eleven weeks, the record being shown on the accompanying diagram.

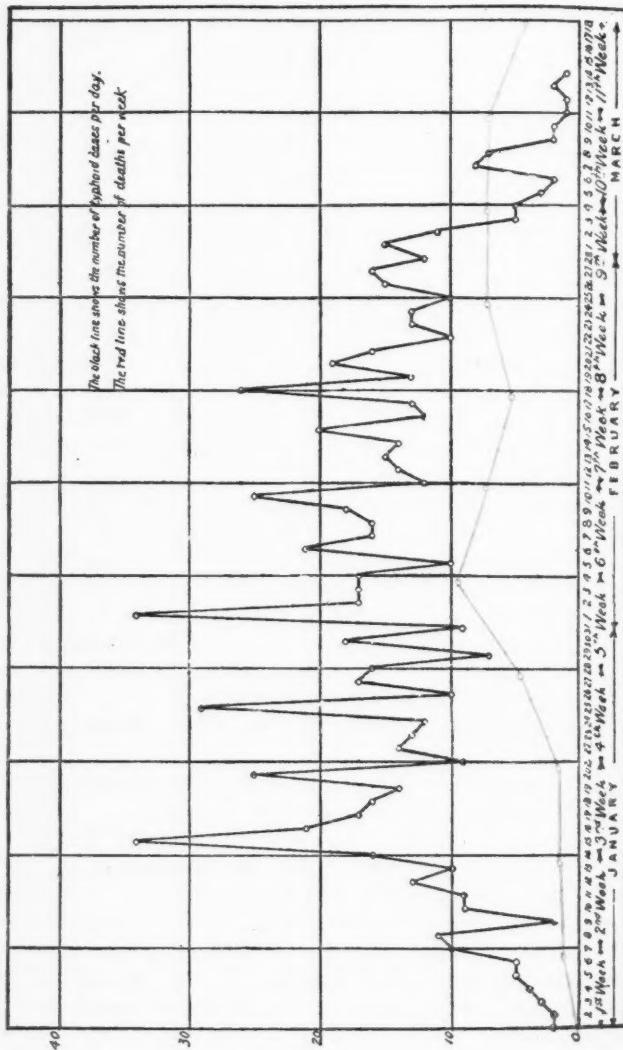


DIAGRAM SHOWING TYPHOID CASES BY DAYS AND WEEKS

As may be seen, in the first week (Sunday, January 1st to Saturday, January 7th) there were 31 cases; in the second week,

70 cases; in the third week, 136 cases; in the fourth week, 111 cases; in the fifth week, 119 cases; in the sixth week, 118 cases; in the seventh week, 114 cases; in the eighth week, 94 cases; in the ninth week, 79 cases; in the tenth week, 25 cases, and finally in the eleventh week (March 11th—March 18th), 4 cases. In all there were 1,196 cases, of which 901 or about 75 per cent. were investigated.

The remainder could not be located for investigation, owing to removal, wrong addresses, and other causes. Of the 901 cases investigated, 52 died before March 18th, the date on which the investigation closed, making a death rate of 5·7 per cent. As, however, several deaths have been reported since, the death rate is probably higher.

According to sex the cases investigated were fairly evenly divided, 422 being males and 479 females. The ages ranged from three to seventy-five years, but the age period most susceptible to typhoid infection, namely, fifteen to thirty years, furnished 47 per cent. of the cases. Of these cases, 33·4 per cent. were children under fifteen years of age. The classification for each age is shown on the accompanying diagram. (See page 734).

No class or occupation was exempt. Rich and poor alike suffered. Spots maps were made for each week of the epidemic and showed that the disease from the first was distributed generally throughout the city. Every case had used the city water supply in some form, either for drinking or domestic purposes. No other common factor was found. The milk supply was carefully investigated, but nothing was discovered pointing to infection along these lines. Other food supplies were likewise excluded. Again, the fact that several of the cases occurring in the first two weeks were in houses without water-closets, and in some cases without even sinks, proved that the source of the epidemic was not to be looked for in sewer emanations. Lastly, the winter season excluded the possibility of infection by flies or from unsanitary conditions surrounding premises.

Thus, by a process of exclusion, the probable source of the infection was brought down to the water supply, and a rigid enquiry was instituted to discover if any abnormal conditions were at work during the three weeks preceding the outbreak which might have caused an unusual amount of pollution to enter it. That the water was liable to occasional pollution was a known fact, as reports on samples sent to the Provincial Public Health Laboratory at Toronto had at various times shown the presence of intestinal organisms.

The map shows that the mouth of the intake pipe of the water supply is placed in the main current of the Ottawa River towards

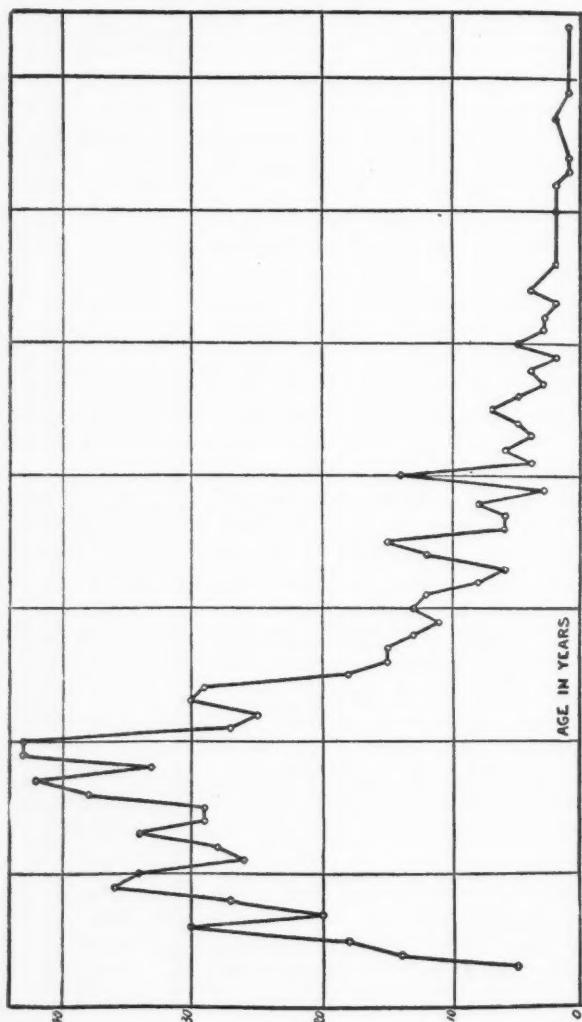


DIAGRAM SHOWING TYPHOID CASES BY AGES

the north bank, well above the city sewer outfalls. From there the water main runs along the bed of the river in a winding course through

Nepean Bay to No. 1 pier, where it enters the channel of the aqueduct. Along the bed of this artificial water-course it runs for a distance of about one thousand yards to the pump house. The city of Hull, situated across the river from Ottawa, takes its water supply from the main current of the river, yet Hull was remarkably free from typhoid this year. Also, tests made of the water at the intake showed it free from sewage pollution, while similar tests clearly showed the presence of intestinal organisms in the tap water. Therefore, the source of the pollution entering the water was to be looked for after the water had entered the intake. At No. 1 pier an emergency valve had been placed in the main by which water could be drawn into the pipe from the surrounding Nepean Bay water whenever the occurrence of fires made the ordinary supply of water unequal to the demand. This valve had been opened at several times, for various periods, during the three weeks preceding the outbreak. Now the water in Nepean Bay is polluted and unfit for drinking purposes. Within a distance of one mile along the shore of this bay above No. 1 pier, several sources of pollution exist. First of all, there is a large railway yard with work-shops, cattle pens, and but recently disused privies. The surface drainage from these premises empties into the bay chiefly through a small stream, which is practically an open sewer. Further up along the bank are several premises, including a mill and a large stable, all without sewer connexion, and within a distance of a mile is the mouth of Cave Creek. This creek runs through Hintonburg and Mechanicsville, the former a portion, and the latter a suburb, of the city, and receives not only the surface washings from a large number of premises, including streets and stables, but also from privies, of which there are one hundred and six located close by, and in several instances directly over, the stream. Farther up the river bank are numerous cottages, culminating with the large summer settlement at Britannia. But it is not necessary to go further; nor is it necessary to say that tests of the water in Nepean Bay confirmed the evidence of the senses. Polluted water, therefore, was being admitted to the water supply every time the emergency valve was opened. But other factors had to be looked for, as the emergency valve had been opened on previous occasions. The unusual factors were found, first, in the very low condition of the water in the river, thus not only requiring the more frequent opening of the valve to supplement the diminished pressure at the intake, but also concentrating the pollution; and secondly, in the diversion of this polluted water directly towards the current

which passes pier No. 1 by the freezing of the shallow places in the bay down to the bottom. In addition to the emergency valve, there is the strong probability of the entrance of polluted water through leaky joints in the main in its winding course along the bed of the bay.

In this paper it is not necessary to take up the other factors which were investigated and which may have added to the pollution of the water supply. The above facts are sufficient to show that the water supply was polluted by the sewage contained in the Nepean Bay water, and it will be admitted that such pollution was sufficient to cause typhoid infection. It is not considered necessary to demonstrate the specific occurrences of excreta from typhoid cases, in dealing with water supplies polluted by the sewage of many people. Of course enquiries were made as to the incidence of typhoid in the portions of Hintonburg and Mechanicsville bordering on Cave Creek, and the history of a few cases obtained; but the well known and accepted facts concerning the presence of typhoid carriers renders this portion of the investigation superfluous to the main issue.

Having now found out that the cause of the epidemic was, in all probability, due to the water supply and that this supply was infected, the next step in the chain of evidence was to see whether the remedies applied to the water supply had any visible effect on the course of the epidemic. The effect, I think you will agree, was conclusive.

On January 13th the emergency valve was opened for the last time, but still evidences of pollution were found in the tap water, very likely coming in through leaky joints in the main along the bottom of the bay. On February 1st a plant was installed at No. 1 pier for the disinfection of the water by the hypochlorite treatment. At first 5 parts per million of available chlorine were used, but this quantity was increased to 0.75 parts on February 15th, as it was found that *b. coli* were still in the tap water. This quantity was increased on the nineteenth to 1 part per million, and again on the twenty-third to 1.5 parts. Up to that time *b. coli* were still found in the water, but none since up to the final closing of the investigation. Therefore, from February 23rd, we may consider the water supply as no longer a causative agent in the epidemic. Now what happened? In that week, the week ending February 24th, the eighth week of the epidemic, 94 cases occurred; in the next week, the ninth week, 99 cases; and in the next, the tenth week, 25 cases; and finally, in the last, or eleventh week, 4 cases occurred. In

other words, all the cases occurring since the elimination of the water supply as a source of infection may be assumed to have received their infection before that event; since then no further infection occurred. Once the source of infection by means of the water supply was removed, the epidemic ceased.

We may, therefore, justly conclude that the epidemic was due solely to the infected water supply. Of course there were some cases due to contact, and secondary infection through food, but the original and continuing factor was the water supply.

The general characters of the epidemic, its sudden outbreak, its general distribution to all parts of the city, and to all classes and conditions of the population, agree with those of other water-borne epidemics. Its occurrence is in conformity with similar outbreaks, in cities of Canada and of the Northern States of the Union, that have been traced to polluted water supplies. The mortality was low, and as is usual in typhoid epidemics, many cases were of a very light nature. The probable occurrence of a larger number of cases from secondary infection through flies, etc., continuing long after the water had been rectified, was obviated by the season.

The maps and diagrams shown in connexion with this paper are those prepared by the Committee of Investigation, which, under Dr. C. A. Hodgetts, medical adviser of the Conservation Commission, investigated this epidemic.

"IN epidemic poliomyelitis of the spinal type, the spinal and cranial meninges are almost invariably affected. This one fact has come out with striking prominence in all of the recent studies. The notion that the disease is a toxæmia affecting the anterior horn cells, taught by Charcot and repeated in our text-books, must be absolutely dismissed. Poliomyelitis is an acute infectious disease with a meningomyelitis as its most fundamental pathologic foundation. Hence, practically all of the patients will show some signs of meningeal involvement in their early stages. Irritative phenomena of the spinal nerves, with hyperesthesia, tenderness, irritability, restlessness, etc., are the most frequent signs of this spinal meningitis, whereas photophobia, hyperacusis, headache, somnolence, indicate the implication of the cerebral meninges."

—*The Journal of the American Medical Association.*

THE FORT WILLIAM EPIDEMIC OF TYPHOID FEVER IN 1906

BY FREDERICK C. DOUGLAS, M.D., D.P.H.

Member Royal Sanitary Institute, London

INTRODUCING the account of the Fort William epidemic of 1906, I would draw your attention to the town itself, which may well serve as a type of the greater number of our Canadian small cities. First, its situation, on the banks of a large river, the Kaministiquia, with a water supply, therefore, almost unlimited. Secondly, the rapidity of the growth of the towns, especially the large influx of foreigners, resulting in unsanitary makeshift dwellings, poor connexions with water taps, and no time to put in sewers.

The entire population of 7,691, with the exception of a small community on the banks of a smaller river, the Neebing, and one boarding-house with a well, took its water supply from the town pumping-station marked A.

The intake pipe, which usually was situated about thirty-five feet from the shore and at a depth of about twenty-eight feet, was, in the fall of 1905, broken by the dragging anchor of a boat, and the broken off pipe was left about fifteen feet from the shore in very shallow water. Pumps raised by suction and distributed 400,000 gallons of water daily to 1,300 houses; practically, then, nine-tenths of the population received this drinking water from the town pumping-station. Less than 30 per cent. of the houses had connexions with sewers; the rest use back privies.

This almost universal and unlimited supply of drinking water had been, and was being, contaminated by sewage: (1) from a sewer (Forde St.) fourteen hundred feet above the intake pipe at the point marked B; (2) from a leaky box-drain situated one hundred feet below the intake pipe, with a shore current guiding it towards the intake pipe broken off and lying in shallow water; and (3) from a foreign community of fifty people, whose excretions were thrown into a small ravine entering the river at right angles, from crews of six hundred boats coaling at that point, and from farms and privies along the bank.

I would next call attention to the typhoid fever existing endemically in the locality, the oldest inhabitants speaking of

low and malarial fevers which probably were either typhoid or paratyphoid. Actual statistics can only be obtained as far back as 1903. In 1903 the case rate per thousand of population was 10·50; in 1904, the typhoid rate per thousand was 24·30; and in 1905 the typhoid rate per thousand was 15·70. This drop in the number of typhoid cases was due to the fact that the provincial authorities had issued a warning to the city that the water supply was dangerous for drinking purposes, and should be boiled. This warning, heeded by a few in 1905, and unheeded in 1906, resulted in the epidemic, the case rate per thousand of population suffering from typhoid or paratyphoid being 109·03 or 1 in every 9·55 inhabitants.

The specific contamination and the directness of the specific contamination of the water supply next demand attention. From the Forde Street sewer, point B on illustration, the excreta of two cases of typhoid fever entered the sewer from the house at the corner of Gore and Edward Streets, the excreta being carried into the river 1,400 feet above the intake pipe without disinfection. This was in December, 1905. Early in January, 1906, four cases of typhoid fever occurred among the employees of the town pumping-station. The excretions of these patients leaked through the very defective box-drain, and entered the river only a few feet from the broken intake pipe, and the shore current directed these excretions almost into the broken intake pipe. In addition, there was a specific contamination of the water supply from the foreign community at point C, one and a half miles above the intake pipe. Two cases of typhoid fever occurred there in January, 1906, and the excretions of these patients were thrown into the ravine, and entered the river at right angles.

I have shown the fouling of the water supply by sewage and direct specific contamination. The milk rounds were carefully investigated, and nothing even suggestive of infection was found. The characteristics of the epidemic were those of a water-borne disease. Wherever there was a tap or hydrant conveying water from the pumping-stations, there were found cases of typhoid or paratyphoid, and yet there were no cases in the boarding-house which took its drinking water from the well at the point marked D on the map.

At the end of the second week, however, evidences of direct contact cases became manifest. These cases occurred in a series of streets where there were back doors, with neighbourly visits. Especially noticeable was the fact that where typhoid fever was in a

house, the inmates of which were not friendly with their next door neighbours, the latter were exempt. On the other hand, friendly neighbours contracted the disease.

One woman, who kept a boarding-house, attended a typhoid case and did the general housework without the slightest attempt at disinfection of her hands. Five cases occurred in this house, though none drank water without boiling it fifteen minutes. Referring to illustration No. 3 (weekly case rate per thousand), I would call attention to the suddenness of the rise of the epidemic and the quickness of its decline under strict hygienic supervision. The situation was taken in hand on February 28th, allowing a maximum incubation period of twenty-one days, after this period typhoid or paratyphoid was unknown in Fort William, with the exception of a flare up of twenty cases which occurred in one definite district marked F, on illustration No. 1. This district took its water supply from a small river, the Neebing, and on searching for the cause, I found situated a mile above this, on the banks of the river, the "town dump," at which night soil from the main town had been deposited; about three weeks previously a thaw had occurred, and the ice melting, the night soil had been carried into the water. Another small epidemic was the result, and this again from a contaminated water supply.

I shall not dwell upon the clinical character of the epidemic except to mention the fact that from personal observation and from conversation with attending physicians, I would say that the fever of over 35 per cent. of the cases did not run the full three weeks. At the end of the second week these patients began to convalesce, and although no bacteriological tests were made, I classified them as paratyphoid, or febriculæ with diarrhoea. The isolation of these cases, the care taken of excretions, etc., had a great deal to do with the successful stamping out of the epidemic.

From a hygienic standpoint, the golden rule, "remove the cause and the effects will cease," was in this case difficult to follow. To cut off a city's water supply one had to think of: (1) the immediate necessity of giving another water supply; (2) the danger of sewage standing in sewers; (3) fire. Our plan, therefore, was to sink two artesian wells, carts conveying the water from these to the houses. Over every tap in the town a placard was placed, labelled, "Dangerous. This water is absolutely unfit for drinking purposes without being boiled for fifteen minutes."

The next step in the treatment was the isolation of the patients, and the disinfection of their excreta. Emergency hospitals were

opened and forty trained nurses were sent for from Montreal, Toronto, and Winnipeg. Inspectors were sworn in as special constables, and the reporting of cases to the City Hall was made imperative. Houses where typhoid existed were placarded "Typhoid Fever in this House." If patients wished to be treated at the hospital, the house and bedding were fumigated with formaldehyde after the walls, etc., had been washed down with a 1-40 carbolic solution. The placard was then removed. If patients would not go to the hospital, printed instructions were posted in the room, and those in attendance instructed by inspectors as to the care of excreta, linen, etc. Two tons of crude carbolic were ordered for free distribution.

A daily bulletin was issued regarding the number of cases, and as soon as the public began to see the results of sanitary measures they became more interested, and a general cleaning up of privies, back-yards, etc., took place.

The coal dock section, consisting of foreigners dwelling in shacks, was the hardest to deal with. An amusing incident got them into line. I had mentioned to a reporter that if these shacks were not cleaned up it would be better to burn them. Next day the foreign element was still apathetic. But fortunately the following night two of the shacks did burn up. Next day cleaning up commenced in a frenzy in that section.

The attention of the board of health was drawn to the dirty and unsanitary condition of the city. There were fourteen hundred houses with a water supply, and only four hundred with water-closets. Many privies had had practically no cleaning for years, and hundreds of houses were without a privy. Garbage, manure, and dirt were scattered around everywhere, and pollution of soil, both with organic matter and with typhoid germs, constantly went on. Inspector Wilson was placed in charge, and a good cleaning up ensued. Sanitary notices were printed and issued in different districts, advising people that scavengers would call on a certain date, and that all garbage, etc., must be collected, yards cleaned up, and dirt collected in heaps, or the city would put men to work and would charge for the same. All privies were cleaned up, and an attempt made at disinfection; the pail system with dry earth was advocated for privies; the nuisance ground was supervised, and the pollution of the river stopped.

The total number of deaths from January 1st to April 16th was 69: of these 36 were Canadians, 8 British, and 22 foreign; and the average age was 24. In three and a half months the number

of deaths per 1,000 of population was 8·04. There were 585 cases reported to the office from January 1st until April 18th. Not being satisfied with this, I had a house-to-house census made, which showed that 840 cases had occurred, i.e., case-rate per 1,000 of population in three and a half months, 109·08; or one out of every 9·55 of the citizens had had typhoid fever.

The causes of the epidemic may be summed up as remote and immediate. The remote included:

1. Presence of numerous endemic cases without report of same to the authorities.
2. Systematic pollution of soil and general unsanitary condition of the whole place.
3. Contamination of the water supply with sewage.

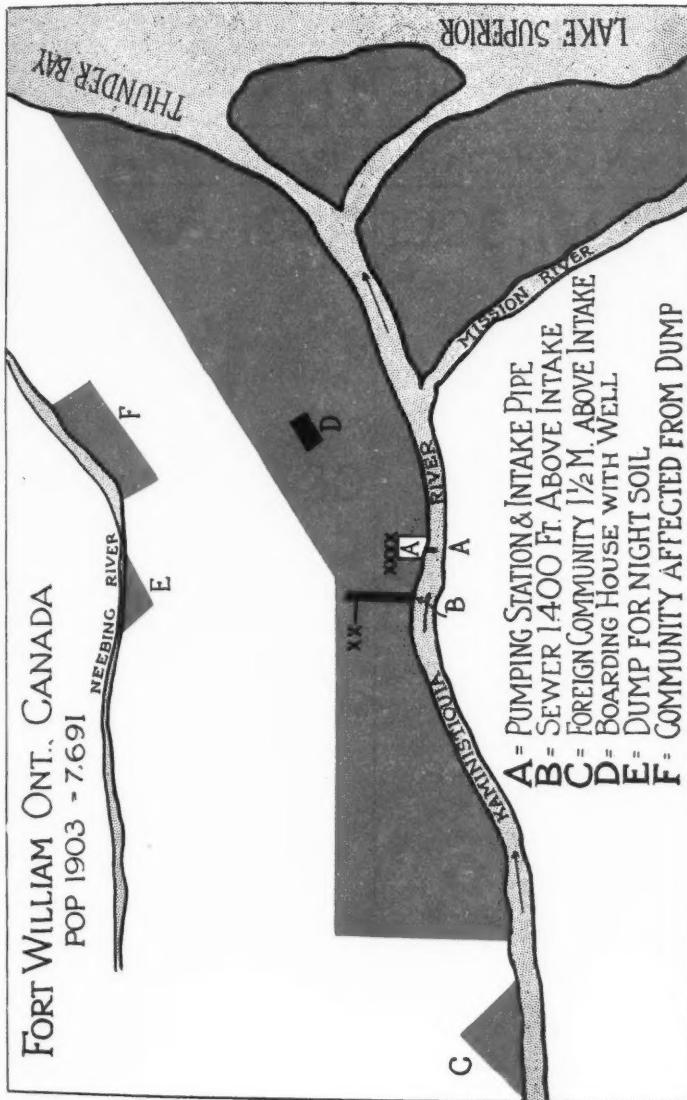
The immediate cause was a specific contamination from three main sources:

1. Forde Street sewer, fourteen hundred feet above the intake, two cases of typhoid.
2. Town pumping-house, four cases of typhoid.
3. Foreign section, one and a half miles above the intake, six cases.

The prognosis for that town as regards typhoid fever is good.

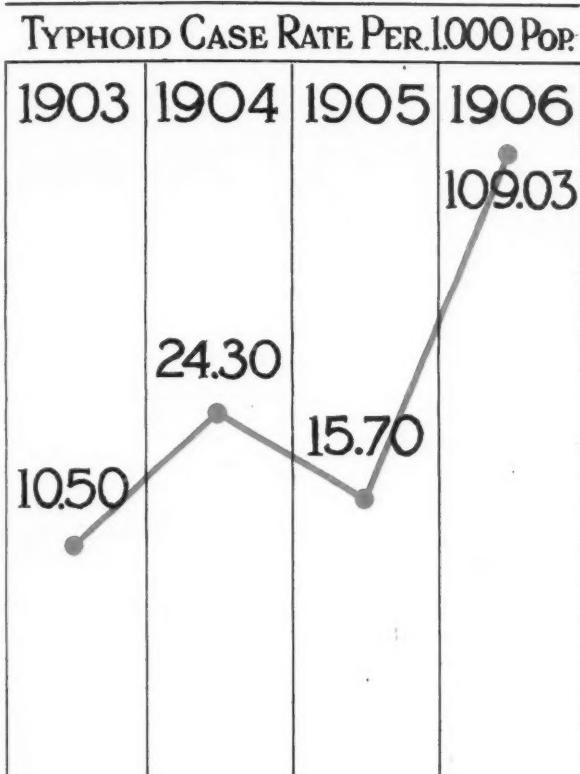
1. A new water supply two and a half miles away from the city has been installed. Watershed is protected from pollution for about fifty miles. This supply is situated two thousand feet above the town level.

2. A new sewage system has been installed.
3. Supervision of the foreign population is under way.



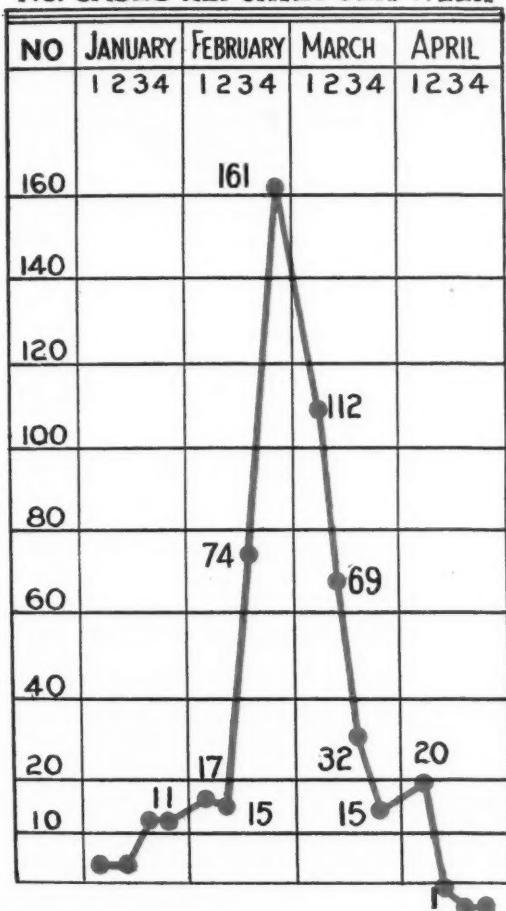
No. 1.—To Illustrate Dr. Douglas' article: "The Fort William Epidemic of Typhoid Fever in 1906."

FORT WILLIAM



No. 2.—To Illustrate Dr. Douglas' article: "The Fort William Epidemic of Typhoid Fever in 1906."

FORT WILLIAM
TYPHOID EPIDEMIC
 NO. CASES REPORTED PER WEEK



No. 3.—To Illustrate Dr. Douglas' article: "The Fort William Epidemic of Typhoid Fever in 1906."

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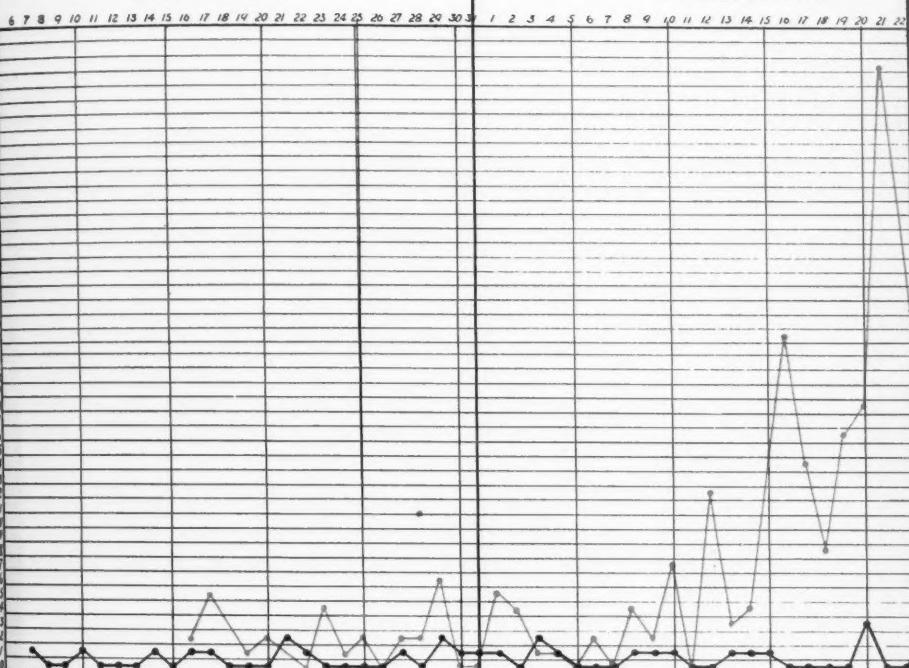
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THE CANADIAN MEDICAL

FORT WILLIAM TYPHOID EPIDEMIC

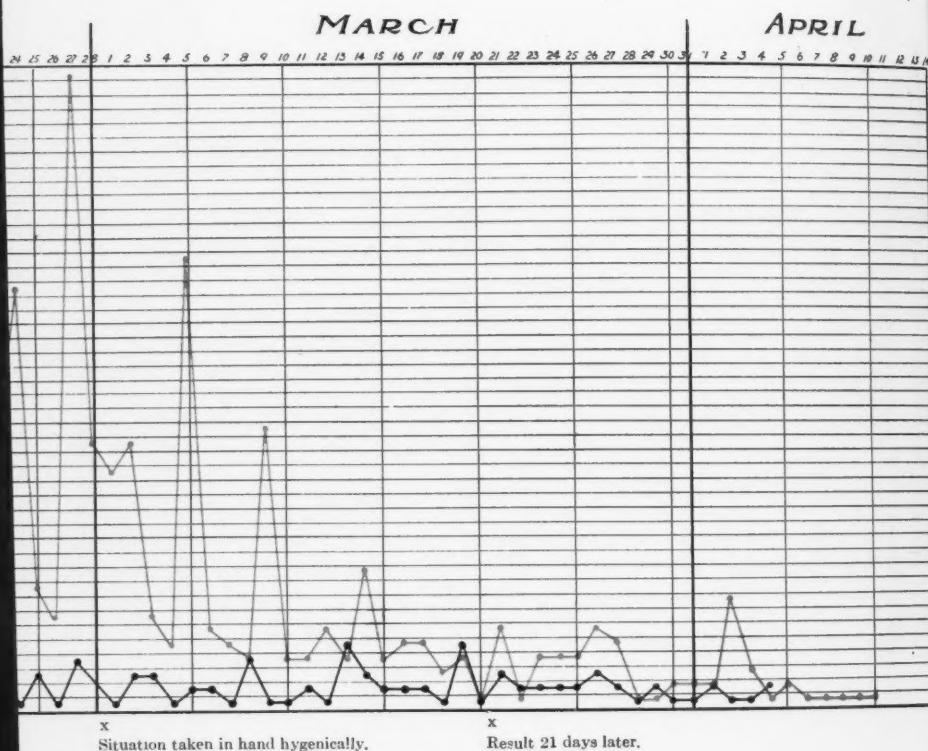
JANUARY

FEBRUARY



No. 4.—To Illustrate Dr. Douglas' article: "The Fort William Epidemic of Typhoid Fever in 1906."

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No.

UM

A LOCAL TYPHOID EPIDEMIC AT MURRAY BAY, P.Q.

BY CHARLES K. P. HENRY, M.D.

Attending Physician to the Murray Bay Convalescent Home

DURING the month of July, 1910, a sudden outbreak of typhoid fever in the Murray Bay Convalescent Home, led to an investigation which blacklisted one more surface spring, and pointed out again the danger of surface level drain pipes.

The Convalescent Home at Pointe-a-Pic, better known as Murray Bay, on the north shore of the St. Lawrence, below Quebec City, has existed for thirty-seven years, and has provided for the summer outing of convalescent hospital cases, and others deserving or needing such, from Montreal and Quebec. It accommodates from sixty to ninety patients, and has a staff of six to eight. For over six years it derived its sole water supply from a surface spring on the mountain side, about six hundred yards away, from which the water has been conducted through buried galvanized iron pipes, with a fall of about two hundred feet to the home. About five years ago a new box reservoir was put in at the spring, and a strainer put on the intake pipe. Up to 1910 the home was especially free from all intestinal troubles, even when containing from twenty to forty inmates under five years of age.

The home was opened about June 15th, 1910, by the staff, who had to prepare the furnishings of the new wing just completed, and the writer himself was resident there with the matron, nurse, and four others, from June 19th to the 29th. The first lot of patients, over forty, arrived June 30th and July 2nd, and later; and, about July 20th, we had eighty-eight patients and a staff of seven, resident in the home, ninety-five in all.

The onset of the epidemic was sudden, except the one case reported in detail below, and all cases date onset of symptoms from July 19th to the 25th. None occurred later. On the 23rd we had seven or eight cases very ill, and on this date the home was partially quarantined, the water supply limited to boiled water, and the use of water from all taps, save the kitchen tap (under the control of the staff) was discontinued. In all, eleven cases

Read at the Canadian Medical Association Meeting, Montreal, June 9th, 1911.

developed. During the following week our private water supply was disconnected outside the home, and the general town supply run in, and all water used for kitchen or drinking purposes was taken through two taps fitted with Berkfeldt filters. Following the change of supply, all taps were allowed to flow for twelve hours before use. A sample from one of the home water taps was taken on August 2nd, before the above change was made, and with a milk sample from one source of supply, both in proper containers packed in ice, was sent to Dr. Walbach, pathologist, to the Montreal General Hospital. I quote his report in part:

CONVALESCENT HOME WATER AND MILK

Sample sent August 2nd, packed in ice, received thoroughly chilled.

Milk: Sediment, small amount in 40 c.c. centrifugalized. Microscopically, no mucus, a rare leucocyte, few nuclei without cytoplasm (mammary epithelium), an occasional foreign particle (dust), and a rare clump of micrococci.

Cultures: Negative for colon bacillus; positive for streptococci (not virulent for guinea-pigs intraperitoneally); other bacteria, one large coccus, saprophytic.

Bacterial Count: 51,000 per cubic centimetre (not high considering time after milking—at least twenty-four hours). In absence of pus, streptococci are not of importance.

Water: Presumptive colon test positive in following amounts, —15, 10, and 5 c.c.; corresponding gas formula was, $\frac{4\cdot4}{2} \frac{4\cdot7}{2\cdot2} \frac{3\cdot7}{1\cdot8}$

Six colonies of twelve selected from a plate culture from one of these tubes gave all cultural tests for *b. coli*. Bacterial count was 80 colonies per cubic centimeter. This is a bad water.

An inspection of the milkman's premises was made and all found satisfactory. At the site of the spring, situated as it was in a small clump of trees, at the junction of two public roads less than twenty feet from either, evidences of wayfayers were found, and it was considered that possibly a convenience had been made of this sheltered corner by some of the *habitants* who had had typhoid during the preceding winter, and some of whom were known to live on one of these roads about one and one-half miles away. This thicket was cleared up, all underbrush cut out, giving a view of the spring from the road, and it was placarded "dangerous." As far as is known there was but one family who used this spring outside the inmates of the home. Besides the town water supply

they get one pailful daily direct from the spring for drinking purposes, and it was not used exclusively even for this.

On July 19th I saw a maid in this family, who had been ill for over a week with backache, and her case was, briefly, as follows:

Emily B.—Table-maid, French, seen July 19th, 1910; complaining of backache attributed to strain of lifting a trunk one week before; remained in bed for one week with a temperature of 100° to 101.6°, slow pulse, abdominal distension, constipation. She went home about July 25th, and was treated by her local French physician who did not consider she had typhoid. A Widal test was negative on the fourteenth day of her illness, and she was up and about in the latter end of August, suffering from what must have been typhoid spine, for which a plaster-jacket was applied. This made the twelfth case from the spring. She had no rose spots and no splenic tumour, but the course was undoubtedly that of a mild typhoid.

No patients in the home had had typhoid recently, none less than three months before admission. No cases had occurred since March in the surrounding country, and none at all in the town of Pointe-a-Pic during the past year, and no unusual number of intestinal diseases was observed during the summer, and none of these country cases of typhoid were users of the town's general water supply. This water supply comes from mountain springs at three sites widely separated, above the level of all dwellings, and a sample from this was examined by the Provincial Board of Health, which reported as follows:

Water analysis, July 30th, of a sample taken from a tap at the Chateau Murray, Pointe-a-Pic.

Turbidity.....	20
Colour.....	15
Bacteria:	
1 c.c. agar 20°C.....	362
B. Coli in 1 c.c.....	0/3 samples.
10 c.c.....	1/2 "
50 c.c.....	1/1 "
Chlorine.....	3.8
Hardness.....	50.0
Alkali.....	35.0
Incrust.....	15.0

After our water analysis the case was proved, as far as our

spring was concerned. The source of contamination of this was still to be found, and here it is necessary to detail the case of a servant who was residing as a cook in a summer cottage situated one hundred feet higher and directly above the spring. Their water supply came from springs up the hill above the house, and an analysis of a sample of this by Dr. Walbach, in August, 1910, showed that the water was "colon free with a low, general count." This latter spring and the home spring were parts of the same water-shed, at different levels.

Thanks to Dr. C. N. B. Camac, of New York City, who was at Point-a-Pic, I am enabled to give the following conclusive facts ascertained by him after I had left Pointe-a-Pic: The drain from the summer cottage, where this cook lived during the summers of 1909 and 1910, was composed of iron pipe, about 3'5 in. in diameter, covered only in places, most of it exposed in loose rock formation, and crossing under the boulevard above the home spring, sunk in concrete only at this point. It joined the main town drain. The cottage pipe drain reached within twenty-five feet of the spring on the upper side, and passed on two sides of the spring, and at all points above it in level.

On September 12th, when these pipes were examined by a practical plumber and Dr. Camac, a portion of the pipe, ten feet from the road and fifty feet from the spring, was covered with small stones and some moss. When these were removed an irregular hole in the pipe 3'5 in. by 1'5 in. on its surface was exposed, with a crack 11 in. long leading upwards from it.

The road lies between this point and the spring, which is about 10 ft. lower. On September 16th a solution of scarlet dye of about ten gallons was poured on the ground above the broken pipe. No discoloration could be noted in the spring water. A leaking joint was also found on the same date, and another broken joint from which no leak could be made out. There is no doubt that the spring's contamination was from this drain, and the case mentioned above furnished the typhoid organisms which produced this epidemic. The case reported is as follows:

Bridget C.—Cook at Mr. T.'s summer cottage, was first seen by me July 28th, 1909. She had then been at Pointe-a-Pic for four weeks, or longer, and had had "dyspepsia" for two to three weeks prior to this visit. I saw her four times and noted she had vomiting, sweating, temperature of 100° to 102°, pulse rate of 120, and was at work. After a few days in bed, and the use of gastric sedatives, her mistress reported she was better, and she

returned to work. I saw her again August 18th and found she had cholecystitis and femoral thrombosis, which were evidently due to typhoid, and sent her to the Montreal General Hospital. Here she remained till October. A Widal reaction was positive, and a blood culture negative; her stools and urine were not examined for typhoid bacilli. She had acute cholecystitis but refused operation. The butler in this same household developed typhoid in Albany about three weeks after his return from Pointe-a-Pic, and at least six weeks after Bridget left Pointe-a-Pic for the hospital. During the winter of 1909-1910 Bridget had two or more attacks of gall-stone colic with jaundice, and some cholecystitis. In the summer of 1910, Bridget was cook at this cottage again. She arrived at Pointe-a-Pic at the end of June, 1910, and her excreta passed through the above described defective drain during the summer, and in from four to six weeks after her arrival, typhoid broke out in the home.

On October 10th, 1910, in Troy, N.Y., she was operated on by Dr. J. B. Harvie for cholelithiasis, and an examination of the gallstones found gave a growth of pure typhoid bacilli, according to a careful and completely conclusive examination by Dr. Walter T. Diver, assistant pathologist, Troy Hospital. Though requested, no bacteriological examination was then made of her stools or urine.

The chain of evidence appears complete. A localized outbreak of typhoid occurs in a convalescent home supplied by water from a single, isolated source, which was found to be badly contaminated by colon bacilli, and all other sources of infection were excluded. This spring was just below a defective surface drain pipe from a summer cottage where a patient had ambulatory typhoid the summer before the epidemic occurred, had frequent attacks of gall stone colic and cholecystitis the year of the epidemic, and gave at operation a pure culture of typhoid bacilli from the nuclei of the gall stones.

In the home containing ninety-five people, we had eleven cases, or 11·6 per cent. of those exposed contracted typhoid, one died, about 9 per cent. mortality. Complications noted were: intestinal haemorrhage, two cases; vesical haemorrhage, one case; relapses, three; peripheral neuritis, one; abortion, one. Certain cases were of special interest; namely, Miss G., the home nurse, aged twenty-six; well till about July 11th when she complained of stiff neck and pain in the right shoulder which passed off with massage. She then had headache, backache, pain in the lumbar spine,

slight cough, pain in the right iliac region, and hyperæsthesia over the right lower costal area. She had been operated on for appendicitis in the late winter of 1910, had had pleurisy, had been to the mountains to recuperate, and was not very well when she took the home position. She went off duty July 11th. She then developed a range of temperature of 100° to 101°, with loose stools for two days following a strong laxative; she had no splenic tumour and no rose-spots or distension, and the case was considered a sub-acute pleurisy, as on July 20th there was a definite friction rub in the right lower axilla, with fine crepitations. The maximum temperature was 101·6° and it fell from 100·6° on July 20th to normal in six days. She was then up and about and out driving, and again developed a gradual rise in temperature to 101°, which reached normal again on the thirteenth day, and convalescence was uninterrupted. A Widal test was positive 1 in 160 the day before her temperature reached normal the second time. Even in retrospect this patient did not suggest typhoid, and, with pulmonary symptoms, we would not have made any other diagnosis than pleurisy, were it not that the case occurred during the epidemic. She had nothing to do with the patients in the home after the first day she complained; namely, July 11th. One other case was well and out of doors in less than three weeks, from the onset of symptoms.

Mrs. H., aged fifty, the home matron, showed a very sudden onset, July 23rd (the preceding day she felt perfectly well). She had severe headache, backache, diarrhoea, malaise, fever 102°. She then ran a severe typhoid, very toxic, with marked deafness, abdominal distension, and intestinal haemorrhages which began on the ninth day. Abdominal pain and tenderness at the appendix region were so severe that we feared perforation from the eighth to the twelfth day. She also had retention of urine requiring catheterization, followed in a few days by profuse bladder haemorrhages which resisted all treatment, even irrigation with adrenalin solution. She died of toxæmia and anæmia, August 12th, the twentieth day of illness. The Widal reaction was positive on the seventh day. Dr. William Osler saw her in consultation with me several times. She was the fourth or fifth case that developed.

Mrs. H., aged forty, seventh case; indefinite onset about July 19th; intestinal haemorrhage on the fourteenth day; had a relapse; sent to the Montreal General Hospital, and was discharged October 7th. Developed peripheral neuritis of the lower

limbs after her return home and was attended by me in October and November, in Montreal.

Mrs. M., aged twenty-seven, second case, began July 20th, severe type, sudden onset, profuse rash, vomiting, diarrhoea, toxæmia marked, abortion August 1st (third month), sent to the Montreal General Hospital, where she had a relapse.

For the conclusive evidence I am greatly indebted to Dr. C. N. B. Camac, of New York, Dr. J. B. Harvie, of Troy, and Dr. Walter T. Diver, of the Troy Hospital, without whose observations and reports the suspicions as to the causative factors of the epidemic could not have been scientifically confirmed.

"THE weekly report of the United States Public Health and Marine-Hospital Service for June 9th, contains a preliminary communication from Dr. John F. Anderson, director of the hygiene laboratory at Washington, D.C., and Dr. Joseph Goldberger, on 'Experimental Measles in the Monkey.' An unsuccessful attempt to inoculate monkeys with measles was reported by Grünbaum, in the issue of the *British Medical Journal* for April 9th, 1904. The present authors report four series of similar experiments on rhesus monkeys, in which they produced moderate febrile reaction, cough, and a sparse eruption. As a result they believe they 'have demonstrated the susceptibility of the rhesus monkey to inoculation with the blood of human measles drawn from the general circulation early in the eruptive stage.' This conclusion, if hereafter proved to be true, will be one more fact in the cumulating mass of evidence illustrating the close simian kinship of man."—*Boston Medical and Surgical Journal*.

Case Reports

ACUTE VOLVULUS OF THE SMALL INTESTINE RESECTION: RECOVERY

MISS B. R., aged twenty-two years. Dr. A. G. Nicholls, the family physician, has kindly supplied the following notes:

Personal history: Measles when a child; chorea at the age of four, nine, and twelve; rheumatism and valvular diseases of the heart at twelve; pneumonia at fourteen; subject to sore throat; bowels apt to be irregular.

Family history: Father and mother alive, also one brother and one sister. Nothing worthy of mention here.

History of abdominal condition: About the spring of 1909, she was taken with severe abdominal pain of cramp-like character, moderate elevation of temperature, vomiting of bilious matter, and obstinate constipation unrelieved by purgatives or enemata. This continued for three days, when the pulse becoming more rapid and her appearance more distressed, she was removed to the General Hospital. Here laparotomy was performed, right lateral oblique incision (appendix incision). The abdomen was slightly distended. On section thin, blood-stained serum exuded in large amount. A large part of the small bowel was collapsed, and the remainder was much distended. No source of obstruction was found, save that in handling some adhesions must have been torn apart, for on two coils of small bowel were found two oval, eroded bleeding spots, about one inch by three quarters, which had evidently been attached. There was no thickening of the bowel wall at these spots, and nothing to indicate the nature of the adhesion in question. The abdomen was sewn up, and the patient made an uninterrupted recovery.

On February 1st, 1910, Dr. Nicholls was called to see her for another attack of abdominal pain with vomiting and very slight pyrexia. This was speedily relieved and she was better the next day. On May 28th, 1910, at night, I was called to see her for an attack of abdominal pain with vomiting. The pulse was 90 and the temperature $99^{\circ}2$. The vomiting was first of food, and then of mucus. The attack followed outing and ice-cream. The fol-

lowing morning, the pain was more severe and the vomiting was bilious, the pulse was 120 and the temperature about 103°. Her condition was much more grave, and in view of the past history she was hurried to the Western Hospital, within thirty hours of the onset of symptoms.

I saw the patient with Dr. Nicholls immediately on her admission to hospital. From her appearance it was evident that she was seriously ill. Her face was pinched, drawn, and anxious, having that peculiar unmistakable expression known as the facies abdominalis, which is always so indicative of grave abdominal disease. The pulse was small, 166, and difficult to count; the temperature was 103·6°. Abdominal pain, recurring and distressing vomiting, the vomitus having a foul odour, and obstipation, were all present. The breathing was thoracic, the abdomen evenly distended, very tender, and rigid, rendering palpation and percussion unsatisfactory. On auscultation the heart sounds could be distinctly heard all over the abdomen, but there was no evidence of intestinal peristalsis.

Laparotomy was immediately performed (lower medial incision). On opening the peritoneal cavity a quantity of dark, bloody fluid, having a peculiar musty and disagreeable odour, flowed from the wound. Numerous greatly distended and very dark, almost black, gangrenous looking coils of small intestine appeared, and were allowed to escape upon the abdomen. The affected bowel was deeply congested, swollen, and friable; in spite of the most gentle handling, it gave way in several places, allowing blood and bowel contents to pour into the peritoneal cavity. Examination soon revealed a volvulus or twisting of several loops of small intestine upon its mesentery as a base, causing complete obstruction and strangulation of the gut.

The affected bowel was rapidly resected and an end-to-end anastomosis made. The removed intestine, with its contents, completely filled an ordinary wash-basin. The peritoneal cavity was cleansed by irrigating with normal saline solution, and the abdominal incision closed, in layers, without drainage.

The patient left the operating table apparently none the worse for the operation. During the first twenty-four hours her condition caused great anxiety; she was delirious at times, and the pulse continued rapid; in fact, it increased in rapidity, and twelve hours after operation was charted by the nurse at 180, and respirations 44. Twenty-one hours later her condition was in every way much improved; pulse, 108; temperature, 99°; and respira-

tions, 20. From this time on her convalescence was satisfactory, and her recovery was complete. She left the hospital July 2nd, one month after admission.

The intestine removed was examined by Dr. Nicholls, pathologist to the hospital, who reported it to be gangrenous, and to measure seven feet five inches in length. I am indebted to Dr. Nicholls for referring this patient to me, and for his valuable assistance in the after treatment of the case. I wish, also, to express my appreciation of his prompt action in getting the patient to the hospital with the view of operative interference, for I consider that it is very largely due to this fact that the patient is alive to-day.

Remarks: A volvulus may involve nearly the whole of the small intestine or one or more loops of it. Treves says that in the majority of cases one to two feet is implicated, but that, in one or two instances, five feet of bowel were discovered to have been twisted. Any part of the intestine may be involved from the duodenum to the ilium. In this case a part of both the jejunum and ileum was strangulated.

The physiological limits of resection of the intestine is a question of practical interest to the surgeon who desires to know what length of bowel it is possible to remove without affecting nutrition. Wolfgang Denk, after carefully studying fourteen patients from whom three hundred cm., and upwards, of small bowel had been removed, concludes that, when the operation itself is well borne, the ultimate prognosis is favourable if not more than half the small intestine is removed; but that resection of two-thirds of the small bowel inevitably leads to fatal failure of nutrition, though this may be deferred for several years.

The ultimate result in this case should therefore be good, as scarcely one-third (7 ft. 5 in.) of the total length was resected, the average length of small intestine in the female being 23 ft. 4 in., according to Morris. The patient was presented at the meeting, a year after operation, in excellent health.

Montreal.

FRANK R. ENGLAND.

INTESTINAL OBSTRUCTIONS DUE TO MECKEL'S DIVERTICULUM

ERNEST P. POWELL, aged twenty-three, English immigrant, admitted to Winnipeg General Hospital, March 22nd, 1911, from immigrant's train. The patient complained of severe pain in the abdomen, chiefly about the umbilicus. Previous to the present complaint he never had a day's illness since childhood, had always worked on a farm, and had had no internal trouble at any time. An older brother later stated that the patient had never had any discharge from the umbilicus. During the sea voyage he was sea-sick, but had fully recovered before landing. While on the train he ate canned beef on March 20th, both for lunch and supper. Early on the morning of March 21st, he was awakened with severe abdominal pain, the bowels moving at this time, but not again.

From this time on vomiting occurred frequently. His brother and also some other passengers ate of the same canned beef. One girl had some vomiting but made a rapid recovery.

On admission at 4.30 p.m., the patient was drowsy and complained of pain in the abdomen. The abdominal wall was rigid, particularly over the right rectus, the point of greatest tenderness being an inch and a half immediately to the right of the umbilicus. There was considerable distention; the liver dullness was normal. His temperature was 101.8°, per rectum 102.6°, pulse 120, respirations 24. The abdomen was clearly the site of the trouble, the other systems revealing nothing abnormal, except the well-marked drowsiness.

A differential diagnosis was difficult to make. Simple ptomaine poisoning was ruled out and a probable diagnosis of appendicitis made. Operation was begun at 7 p.m. The abdomen was shaved and a 10 per cent. tincture of iodine applied. Under ether anaesthesia, preceded by ethylchloride, a right rectus incision was made. It was found impossible to expose the appendix for some time, as the bowel was tied down from some cause that was not clear at first. Finally, the ileum was brought out of the wound and the cause of the trouble became apparent. About one foot above the ileo-cæcal valve the bowel was observed to divide into two nearly equal parts, these running off at an acute angle. The internal one passed inwards and was found to be attached to the umbilicus. It was a distinct piece of gut throughout its length, with a blind

end attached to the umbilicus. Several feet of small intestine were strangulated by passing from above downwards between the diverticulum and the abdominal wall (persistent Meckel's diverticulum).

A second incision was made at the umbilicus and the diverticulum severed at both ends. The lumen of the bowel extended so closely to the umbilicus that it required to be inverted to close it off. The opening at the ileum was also inverted. In our judgement the strangulation of the bowel had not resulted in sufficient devitalization to demand excision. In addition, the condition of the patient was so extremely bad that further operative interference was out of the question. Both wounds were closed, through and through stitches being used to shorten the time of the operation. The patient left the table in extremely bad condition and died at 1 p.m.

The diverticulum first described by Meckel in 1812,* and since then named after him, is a remnant of the vitelline duct, which duct in the embryo connects the rudimentary intestine to the yolk sac. It normally disappears after the placental circulation is established. In autopsy it is found in about two per cent. of cases. This diverticulum is generally attached to the convex border of the ileum, occasionally laterally, and very rarely between the layers of the mesentery. In shape it is usually cylindrical or somewhat conical, its structure is exactly the same as that of the intestine, showing the peritoneal, muscular, and mucous coats. Its diameter is usually smaller than that of the intestine from which it springs, but may be as large. It is usually two to three inches long. As a rule it has no mesentery, but occasionally a short mesentery is present. The classification given by Eisendrath,† sets forth the varieties very well. Briefly they are as follows:

1. Canal persistent at both ends. 2. Canal persistent at neither ends but centre forming a cystoma. 3. Canal persistent at umbilicus. 4. Canal persistent at ileum. 5. A cord attached to the umbilicus but not to the ileum. 6. A persistent cord, without any canal, attached to umbilicus and ileum. The case here recorded falls most clearly under the fourth class. It is rare that the lumen of the bowel maintains its size up to the umbilicus without a fistula being present during life.

JASPER HALPENNY.
PERCY G. BELL.

Winnipeg.

* "Meckel-Handbuch der Pathol. Anat." 1812.

† Eisendrath D.U., *Annals of Surgery*, Vol. I, p. 1278.

Editorial

SIR WILLIAM OSLER

WHOM the king delighteth to honour is as significant of the king as it is of the recipient of his favour. The king who is careful to discover virtue in his subjects will himself receive loyalty in return, since the source of loyalty and the spring of honour lie close within the crown. The late Mr. Gladstone used to say that, good sleeper as he was, he often lay awake considering the list of honours. Whoever was responsible for the ennobling of Professor Osler and his family, could rest easy in the belief that his action would receive universal commendation. A new and perfect knight has come to the Round Table, and will confer as great honour as he has received. The only wonder is that this elevation to the ranks of the knighthood should have been so long delayed, as the career and character of Professor Osler has made of him a shining mark these twenty years past.

Sir William Osler was born at Bond Head, Ont., in 1849, son of the late Rev. F. L. Osler, and received his education at Trinity College School; Trinity College; Toronto University; McGill University; University College, London; Berlin and Vienna. He received the degree of D.Sc. from Oxford; the degree of LL.D. from the Universities of McGill, Toronto, Aberdeen, Edinburgh, Yale, Harvard, Johns Hopkins, and Liverpool; and the degree of D.C.L. from Trinity University, Toronto. Sir William Osler has been engaged in professorial work since the early seventies, having been professor of the Institutes of Medicine at McGill University from 1874-1884; professor of clinical medicine at the University of Pennsylvania from 1884-1889; professor of medicine at

Johns Hopkins University from 1889-1904. He was Gulstonian lecturer at the Royal College of Physicians, London, in 1885, and is now regius professor of medicine at Oxford and honorary professor of medicine in Johns Hopkins University. Apart from his professorial work he is the author of "Cerebral Palsies of Children," 1889; "Chorea and Choreiform Affections," 1894; "The Principles and Practice of Medicine," 7th edition, 1909; "Lectures on Abdominal Tumours," 1895; "Angina Pectoris and Allied States," 1897; a monograph on "Cancer of the Stomach," 1900; "Science and Immortality," 1904; "Æquanimitas and other Addresses," 1904; "Counsels and Ideals," 1905; "Thomas Linaere," 1908; "An Alabama Student and other Biographical Essays," 1908.

If, at any future time, the framers of the honour list should be at a loss for candidates whose merits they might commend to the notice of His Majesty, we would suggest to them a survey of the field of medicine in Canada. We cannot pretend that Sir William Osler has been chosen from that field, as he has long since belonged to a larger world. Indeed, with possibly one exception, we do not remember that any Canadian has ever been chosen for knighthood on account of his achievements in the medical sciences alone. One or two recipients suggest themselves, but they had a career in the political as well as in the medical world. In 1887 Sir James Grant was created K.C.M.G., but the common belief is that he received this distinction for his personal services towards a member of the royal family, rather than on account of his services, great as they had been, to medicine at large. Many men are yet unmarked, who by their personal distinction and by the inestimable benefits which they have conferred upon humanity, might well be chosen for royal favour, so that their fellow-practitioners might be encouraged to emulate their example.

If our advice were sought by the framers of this list, we could readily suggest the names of physicians and surgeons

to our splendid hospitals, and of the deans, past and present, of medical schools which are not excelled in quality by any others within the British Empire. By the elevation of Sir William Osler to the ranks of the nobility, the baronetage receives a new respect in the eyes of all Canadians. His official ennobling is merely a recognition that he has long since ennobled himself and the profession to which he belongs.

A HOSPITAL FOR INEBRIATES

A WORK deserving of the support of the public is that of the Ontario Society for the Reformation of Inebriates. It is now five years since the society was organized, and the work it is attempting is directly in line with that humane and wise view that characterizes present methods of dealing with the class which drifts into the police court.

The objects of the society, briefly, are: 1. To promote the reformation of indigent inebriates in Ontario, (a) by making use of the public hospitals of the province for the purpose, and (b) by combining therewith the Massachusetts probation system. 2. To promote the reformation of inebriates in Toronto as follows: A medical officer and a probation officer attend the police court, and offer medical treatment and help to inebriate prisoners. The medical treatment is given by the medical officer, either in the home of the prisoner, at the office of the physician, or in a ward of one of the public hospitals of the city. The probation officer acts the part of a friendly visitor, assists in finding employment when necessary, and helps in other ways.

The society is in need of a special hospital, entirely devoted to the treatment of inebriates. This is a commendable undertaking, and one which we believe should meet with the ready response and sympathy of the public and the government. It is only in such an institution that these cases can be properly cared for and treated with any hope of success.

THE ONTARIO MEDICAL COUNCIL

IT would appear that the affairs of the Ontario Medical Council are approaching a crisis. An editorial in the Queen's University *Medical Bulletin* for May, would lead one to suppose that the revolt of the universities against the council examinations is becoming widespread, and the demands for reform must be met in the most graceful manner if the council is to continue to exist as a force in medical education.

The Queen's men invariably show a bold front to their enemies, real or supposed, and Dean Connell is a sturdy champion of the rights of his university. Possibly he takes too extreme a view of the position of the University of Toronto, which simply demanded the very things he is at present asking for; at all events, now that the universities are practically agreed on what they want, the desired changes should come.

Probably the passage of the Roddick Bill will give the members of the council an opportunity to modify themselves, without the sacrifice of prestige, as Ontario cannot accept the Bill and continue to exist as a serious competitor of Quebec and other provinces with her present examination methods in force. Students will not face an uncertain examination before the Ontario council in addition to its large fee of a hundred dollars, when they may register in Quebec by simply taking the McGill or Laval examination. It means that before Ontario can come into the Roddick agreement, its registration method must be similar to those of Quebec, Manitoba, and some of the other provinces.

The council may rest assured that if it will not act itself, Sir James Whitney, who loves just such a promising situation, will come to the rescue of his medical constituents. If the Ontario council is well-advised it will seize this opportunity to rehabilitate itself in the eyes of the profession, compare its differences with the universities, and make possible those

reforms in medical education which could not previously have been attempted.

Dean Connell is to be congratulated on the stand he has taken, and although we think he makes a mistake in expressing so little faith in the good-will of the University of Toronto, still one must make excuse for those who find it no easy task to carry on the work of a great department under unusual difficulties. Those who know the president of the University of Toronto and the dean of the medical faculty understand that their feelings for Queen's are only those of warm friendship and enthusiasm.

MARITIME MEDICAL ASSOCIATION

THE sudden exit of a prosperous medical association calls for something more than passing comment. At the annual meeting held quite recently in Halifax, dissolution of the Maritime Medical Association was decided upon by unanimous vote without debate or expressions of regret. The death of the association under such unusual circumstances must have been premeditated and based upon substantial reasons; otherwise there would have been evident manifestations of opposition. The reasons for this action are easily explicable.

The Maritime Medical Association was formed in 1891 and met alternately at St. John, Halifax, and Charlottetown. Marked success attended the efforts of its promoters, and many useful reforms were accomplished. At first a numerically strong and influential section of the profession, if not actively hostile, were more or less lukewarm in their support, fearing that the success of the association would endanger the existence of the provincial societies which had been active for many years and were entrusted with important functions which could not be conveniently handed over to the larger

body. Contrary to expectation the provincial organizations have not waned, but waxed, in strength, and this has had the effect in turn, especially since 1905, of making the attendance at the maritime meetings more distinctively local in character.

A more potent factor in shaping events has been a steadily growing conviction in the profession that a more hearty and influential support could be given to the Canadian Medical Association than has been hitherto possible. The true significance of the exit of the Maritime Medical Association is that the profession of Nova Scotia, New Brunswick, and Prince Edward Island have finally decided upon closer union with the national organization. It is very gratifying to know that such praiseworthy motives have caused the disappearance of so useful a society. We are informed that the Medical Society of Nova Scotia has already taken steps to modify its constitution so as to permit of closer union with the various county associations, as well as with the Canadian Medical Association.

THE LAURENTIAN SANITARIUM

THE opening of the Laurentian Sanitarium at Ste. Agathe des Monts is an important move in the campaign against tuberculosis in Quebec. It is proposed by the Laurentian Society to make this institution a centre for the scientific treatment of incipient pulmonary tuberculosis; it is hoped that both in organization and method of treatment it will serve as a model for other sanitaria to be erected throughout the province.

In situation, building, and equipment it is admirably fitted for this purpose: it is within three hours of Montreal; it overlooks one of the beautiful valleys of the Laurentians, where the climate is probably as well suited for the treatment of pulmonary tuberculosis as is to be found anywhere; and

on the appointments and equipment, both for the treatment of patients and for laboratory work, skill and thought have been bestowed. The building at present has accommodation for fifty patients, but it is so constructed that wings can be added, and it is the intention of the society, as funds accumulate, to enlarge it until the building is capable of holding one hundred patients.

An outstanding feature of the opening ceremonies was the enthusiasm and optimistic hope of the various speakers: Mr. D. Lorne McGibbon, of Montreal; Drs. Baldwin and Kinghorn, of Saranac Lake; Dr. Otis, of Boston; Dr. Elliott, of Toronto; Drs. Adami and Lafleur, and Mr. W. H. Goodwin, of Montreal; Drs. Richet and Byers, of Ste. Agathe; and Father Bazanet, the cure of that village. Indeed, this was shared by the large assembly of visitors present, many of whom were members of the Laurentian Society. It indicated that the future of this sanitarium is assured, and it gave a more promising outlook to the broader warfare that is being waged against tuberculosis in the province of Quebec.

Thus far the efforts that have been made in Canada to control tuberculosis have been local, and have been confined chiefly to philanthropic societies and to individuals. And yet, Dr. Kinghorn in his remarks on this occasion made the statement that "any patient, taken in time, is practically sure of being cured." Such a pronouncement suggests the thought that the treatment of this disease has advanced to a stage that warrants the legislatures of the various provinces grappling seriously with the problem of the control of tuberculosis. The disease is too widely scattered to be coped with successfully by private effort. Provincial aid is necessary, and that freely and generously given. The building of sanitaria in Ontario, aided by an educative campaign, has shown, in the decreasing death rate from tuberculosis, what may be accomplished even in a few years. For very shame's sake the provincial legislatures should follow the lead of such bodies as the Laurentian Society.

CARE OF THE FEEBLE-MINDED

THE fifth report on the care of the feeble-minded in Ontario has been issued. It contains a great variety of matter concerning these unfortunates and the attempts that are being made to take an intelligent care of them. Public interest in this important matter has been slow in being aroused, but there is evidence that such an interest exists and that it is spreading rapidly. In her introduction, Dr. MacMurchy, the compiler of the report, says: "The history of this question in Ontario during the present year is marked by an important advance in public interest, in public opinion, and in the action of public bodies, especially that of the board of education in the city of Toronto. It was formerly difficult to obtain a hearing for the case of the feeble-minded, but now people come to the officials of this department, either of set purpose, or fortuitously, and ask what is being done, or what should be done, or what is going to be done, for the welfare of the feeble-minded. Once we had to endeavour, by approaching benevolent individuals, capable officials, or public-spirited citizens, to awaken a little interest in the poverty of the poorest of our citizens, for poverty of the mind is the most desperate poverty of all; but now people in Ottawa, London, Halifax, Montreal, and elsewhere, apply to officials of this department for information and help in regard to a policy that shall at once provide for the needs of these poor citizens and relieve the public purse and the purse of private individuals, by enabling those who can work to maintain themselves, partly or wholly, but always and only under supervision. Once, a smile, or a stray thought, was the limit of public interest, but now the care of the feeble-minded is within the region of practical politics and is being considered by boards of trustees and others, upon whom rests the responsibility of initiating reforms desired by the citizens whom they represent."

The alarming disclosures of gross immorality made by this report make it clear that it is time that this matter of the care of the feeble-minded received serious consideration in each province. Here is a species of immorality (for almost all the unfortunate women bear illegitimate children) that can be prevented. Not to prevent it is not only inhuman but short-sighted, for statistics show that most of the children born of these people are either so depraved in morals that they inevitably end in the police courts, and so become a tax upon the country, or are wholly insane, when again they are a burden to the community. There is a third alternative, as well; namely, that they may merely be simple-minded, which is even more dangerous, for that means a widening of a circle of degeneracy which will in time affect the vitality of the nation.

The question is not an easy one to deal with, but a beginning should be made at once. Dr. MacMurchy's recommendations for such a beginning in Ontario are: an enumeration of mentally-defective children in schools; an oversight and control by this department of all feeble-minded persons who become a public charge or break the laws; a gradual development of this policy of the care of the feeble-minded in accordance with enlightened public opinion in the province. The matter might well be taken in hand by a commission.

AN important Act respecting the production and sale of milk has passed the Ontario legislature. The Act authorizes the council of every municipality to pass by-laws regulating the care of cows, the cleanliness of the places in which the cows are kept or milked, or in which milk is stored, the water supplied to cows, the care and cleansing, construction and type of all utensils used in handling milk, the care, storage, transportation and distribution of milk by producers, carriers,

or vendors, the making of bacteriological tests, and, in general, of all necessary matters regarding the production, care, and transportation of milk.

Some of the more important sections follow:

"No person shall place any preservative in milk intended for human consumption, or sell or offer for sale to any vendor milk from which any part of the butter fat has been removed, or to which water has been added, or which has otherwise been changed from its normal condition, without previously giving notice in writing of such change to such vendor; and no vendor of milk shall sell or offer for sale milk not complying with the standard, or from which butter fat has been removed, or to which water has been added, or which has received special treatment causing it to differ from normal milk, without clearly and distinctly advertising the same in the manner demanded by the regulations of the municipality in which it is sold.

"No milk shall be sold from any cow which, upon physical examination by a duly qualified veterinary surgeon, shall be declared to be suffering from tuberculosis of the udder or milk glands, or whose milk, upon bacteriological or microscopic analysis, is shown to contain tubercle bacilli, or which is known to be suffering from splenic fever or anthrax, or any other general or local disease which is liable to render milk from such a cow a menace to the public health.

"It shall be unlawful to apply the term 'certified' to any milk which does not comply with the following standard:

- (a) It shall be taken from cows semi-annually subjected to the tuberculin test and found without reaction;
- (b) It shall contain not more than 10,000 bacteria per cubic centimetre from June to September, both inclusive, and not more than 5,000 bacteria per cubic centimetre from October to May, both inclusive;
- (c) It shall be free from blood, pus, or disease-producing organisms;
- (d) It shall be free from disagreeable odour or taste;

- (e) It shall have undergone no pasteurization or sterilization, and shall be free from chemical preservatives;
- (f) It shall be cooled to 45° F. or under within half an hour after milking, and kept at that temperature until delivered to the consumer;
- (g) It shall contain twelve or thirteen per cent. of milk solids, of which at least three and one-half per cent. is butter fat;
- (h) It shall be from a farm the herd of which is inspected monthly by the veterinarian, and the employees of which are examined monthly by a physician.

"It shall not be lawful to apply the word 'pasteurized' to any milk unless all portions have been subjected for at least twenty, and not more than thirty, minutes to a temperature of not less than 140° and not more than 150° F. and then at once cooled to 45° or under, and kept at that temperature until delivered to the consumer, and the process of pasteurization shall be subject to inspection by the local medical health officer or such inspector as he may designate; provided always that all such milk shall in all other respects be subject to all the terms and conditions of this Act."

THE bulletins of the laboratory of the Inland Revenue Department, Ottawa, continue to appear with commendable regularity. Bulletins 218, 219, 220, 221, and 222 deal with ice cream, butter, table salt, arsenic as an impurity in drugs, and cream of tartar. Much interesting information is to be had in these pages respecting the purity of these common articles in Canada. It is reassuring to note that the cases of adulteration are few, and that there has, within the past year or two, been a notable decrease in the percentage of samples falling below the standard.

It appears, from the tables, that there has been a marked improvement in the quality of Canadian ice cream during

the past two years. The standard for ice cream, under section twenty-six of the Adulteration Act, requires that this product shall be made from cream and sugar, with or without harmless flavouring and colouring materials, and with or without gelatin, gum tragacanth, or other harmless stiffening materials, in amount less than two per cent., and to contain not less than fourteen per cent. of milk fat.

The report may be summarized as follows: samples fully up to or above standard, seventy-seven; samples nearly up to standard, eleven; samples below standard of fourteen per cent., thirty-one; samples greatly below standard, six; total, one hundred and thirty. It thus appears that eighty-eight samples, or seventy per cent. of those analyzed, reached the standard of fourteen per cent.

In August, 1908, out of eighty samples analyzed, forty samples, or fifty per cent., of the collection, reached this standard of fourteen per cent. milk fat. In August, 1909, out of one hundred and twenty-nine samples of ice cream, seventy-eight samples or sixty per cent. came up to the standard. As the standards for ice cream did not come into force until December 12th, 1910, it may be expected that a further improvement will rapidly follow.

Of the two hundred and eleven samples of butter examined, one hundred and ninety-five, or ninety-two per cent., met the requirements of the standards, which require that it be the clean, non-rancid product made by gathering in any manner the fat of fresh or ripened milk or cream into a mass, which also contains a small portion of the other milk constituents, with or without salt, and that it contain not less than eighty-two and five-tenths per cent. of milk fat, and not more than sixteen per cent. of water, with any added colouring matter of harmless character. Fourteen samples were slightly below the standard in their percentage of milk fat, and in only two instances was there an admixture of foreign fat.

Bulletin No. 221 contains the results of the analyses of one hundred and thirty-four samples of effervescing phos-

phate of soda. Of this number, one hundred and thirty-one samples, or ninety-eight per cent., were found entirely free from, or containing negligible traces of, arsenic. Of the three samples which gave a distinct reaction for arsenic, one sample contained one part in one hundred thousand, and two, half that amount.

Cream of tartar has been made the subject of study on nine different occasions. Since 1887, comparison shows that adulteration is not so common to-day as it was when the investigations began. Of the samples analyzed, twenty-six per cent. came up to the standard fixed by the British Pharmacopœia; namely, 97·5 per cent. of bitartrate of potash; sixty-eight per cent. were above the commercial standard; seven per cent. were below the latter standard; and seven per cent. were adulterated. It was found that the cream of tartar sold by Canadian druggists is not of a higher grade than that sold by grocers.

Book Reviews

MANUAL OF CYSTOSCOPY. By J. BENTLEY SQUIER, M.D., Professor of Genito-Urinary Surgery, New York Post-Graduate Medical School and Hospital; and HENRY G. BUGBEE, M.D., Instructor in Genito-Urinary Surgery, New York Post-Graduate Medical School and Hospital. Price \$3.00 net. Paul B. Hoeber, 69 E. 59th Street, New York, 1911.

The preface to this admirable little book states that it was written in response to repeated applications from students for a short, practical work on cystoscopy; and as such it merits much praise. The statements are concise, and while the technique is described in sufficient detail, and the essentials of a working knowledge of the instruments are set forth, the book has been kept within small compass, there being less than fifty pages of actual text. There are, in addition, thirty full-page plates, nineteen of which are beautifully coloured, depicting with particular accuracy the bladder landmarks and intra-vesical lesions as seen through the cystoscope.

PUBLIC HEALTH LABORATORY WORK. By HENRY R. KENWOOD, M.B., F.R.S., Edin., D.P.H. and W. G. SAVAGE, M.D., Lond., B.Sc., D.P.H. Fifth edition. H. K. Lewis, London, 1911. Price, 10s. net.

This book for many years has been constantly used in laboratories devoted to work in connexion with public health, and has always been found satisfactory. Each successive edition has been an improvement upon the one preceding it, and this, the fifth, will be found entirely adequate for present day needs. So generally accepted a standard requires no extended comment. Like all of Mr. Lewis's books it is comfortable to the hand and eye, and is a valuable addition to his well known "Practical Series."

HYGIENE AND PUBLIC HEALTH. By L. C. PARKES, M.D., D.P.H. Lond., and H. R. KENWOOD, M.B., F.R.S. Edin., D.P.H. Lond. Fourth edition. H. K. Lewis, London. Price, 18s. 6d.

"Parke's Hygiene" has been known to students since time out of mind, and it is only necessary to mention that Mr. Lewis has issued a

new edition which, besides the name of Dr. Parkes, bears that of Dr. Kenwood. This is, in reality, the fourth edition under conjoint authorship of a work which had previously gone into the fifth edition. Barely three years had elapsed since the previous revision, yet with the growth of the science of sanitation it was found necessary to include much new material, and in these seven hundred pages everything essential is contained. In respect of printing, and paper, and general convenience for reading and reference, the book leaves nothing to be desired.

A TREATISE ON DISEASES OF THE NOSE, THROAT AND EAR. By WILLIAM LINCOLN BALLENGER, M.D., College of Physicians and Surgeons, Chicago. New (3rd) edition, thoroughly revised. Octavo, 983 pages, with 506 engravings, mostly original, and 22 plates. Cloth, \$5.50, net. Lea & Febiger, Philadelphia and New York, 1911.

All persons who are engaged in special work upon the throat, nose, and ear are already familiar with this text-book, but they will be glad to know that a new edition has appeared. The book was originally designed as a text-book for students, a guide for practitioners, and a source of reference for specialists, and it still retains those characteristics. It is, in reality, as the author says, a combined text-book and atlas covering its three subjects. The revision is no mere perfunctory adding, taking away, and re-arranging. Every page has been scrutinized afresh, and the whole work has been reset in new type. By a free use of illustrations the successive steps in every important operation are shown, and these are, for the most part, taken from original drawings. The book is beautifully printed, and is entirely creditable to author and publisher.

CESARE LOMBROSO: A modern man of science. By HANS KURELLA, M.D. Translated by M. Eden Paul, M.D. Rebman Company, New York. Price, \$1.50.

This book is a model of biography and an interesting example of the good writing which is growing up in the world of medicine. Of the making of text-books there is no end, but they are relieved by the appearance of many books which have to do with the literature of medicine. Lombroso is a man who is misunderstood in respect of his work as well as of his personality, and the author has done much to make both clear. Lombroso was in reality a reformer as well as an investigator, and he profoundly modified criminal jurisprudence in all countries. The new German criminal code bears abundant testimony

to his influence. Lombroso raised the large question of degeneracy and moral insanity in criminals by his bold scientific hypothesis that there are born criminals representing the type of mankind which existed before the origin of law, the family, and property. He laboured earnestly to establish this thesis by anatomical investigations, and proclaimed that he found in the brains, skulls, muscles, and viscera of criminals peculiarities which resembled those to be found in prehistoric man, in the lower races of mankind, and in certain varieties of apes. Whether or not this conjecture has been proved, or indeed is susceptible of proof, the effect upon jurisprudence has been marked, and an element of humanity has been introduced into the treatment of criminals. Dr. Paul has done a real service in making Lombroso better known to English readers.

THE MENTAL SYMPTOMS OF BRAIN DISEASE. By BERNARD HOLLANDER, M.D. Rebman Company, New York. Price, \$2.00.

Dr. Jul Morel, who was formerly Commissioner in Lunacy in Belgium, writes a preface of two pages to this book, which is rather supererogatory, as it consists almost wholly of eulogy of the author and of himself. Of course it is obvious that patients suffering from insanity should be seen as soon as the disease declares itself, and too much need not have been made of the discovery. The author describes himself elsewhere as one who has "made a special study of mind and character and their deviations from the normal, has collected a vast number of physiological and pathological facts concerning cerebral localization, and is known as the founder of a modified system of phrenology on strictly scientific lines, etc." The book itself contains a vast miscellany of statements, and has the appearance of being very learned; but much of the material, we cannot help thinking, would find a more appropriate place in a year-book. It is proper to add, however, that the author gives evidence of an enormous capacity for research into the literature, if not for investigation, of the problems of psychiatry at first hand.

ATLAS OF MICROSCOPIC DIAGNOSIS IN GYNÆCOLOGY. By DR. RUDOLF JOLLY, Priv. Doc.; translated by P. W. Shedd, M.D.; fifty-two lithographs in colour and two textual figures. Rebman Company, New York. Price, \$5.50.

The Rebman Company is noted for the publication of translations of the best German texts, usually with a wealth of coloured plates to illustrate the various conditions which are described. In this work by Jolly, translated by Dr. Shedd and illustrated by Mrs. Ehlers with

fifty-two lithographs, specialists in gynaecology have a means of making themselves familiar with the pathological and physiological histology of the various subjects with which they have to deal, which can only be rivalled by actual microscopic examination of the tissues themselves. The text is brief and lucid, and with the figures makes of the book a precious possession.

WHAT TO EAT AND WHY. By G. CARROLL SMITH, M.D., of Boston, Mass. Octavo of 310 pages. Cloth, \$2.50 net. Philadelphia and London: W. B. Saunders Company, 1911. Canadian agents, The J. F. Hartz Company, Limited, Toronto.

The author's attempt is a moderate one,—“to place before the medical student, and particularly the active, busy practitioner, a book describing the fundamental elements of food and the principles underlying its use, the essential reasons why a change of diet in certain diseases is desirable, and how this change may be made in the most practical, time-saving way, that there may no longer be an excuse, except in rare instances, for the country physician sending his patient to the city specialist to be dieted after an accurate diagnosis has been made.” The writer seems to have done this satisfactorily. In addition to the discussion of diet in the various diseases benefited by selected food, a number of diet lists and receipts are given, as well as tables showing the chemical composition of food materials.

STUDIES IN CARDIAC PATHOLOGY. By GEORGE W. NORRIS, M.D., Associate in Medicine at the University of Pennsylvania. Large octavo of 233 pages with 85 original illustrations. Cloth, \$5.00 net. Philadelphia and London: W. B. Saunders Company, 1911. Canadian agents, The J. F. Hartz Company, Limited, Toronto.

The outstanding feature of this book is the beautiful illustrations. These are eighty-five in number, selected by Dr. Norris from the museums of several of the Philadelphia hospitals. The text is admittedly mainly an explanation and elucidation of the illustrations, but as such it is clear and sufficient. Warm praise must be given to author and printer for the rare beauty and finish of the illustrations. Such a book as this at once suggests the opportunity that is open to pathological museums to widen the field of their usefulness by publishing, periodically, illustrations, with explanatory

text, of the more interesting of their exhibits. This work of Dr. Norris and W. B. Saunders Company might well be used as a model.

A MANUAL OF THE DISEASES OF INFANTS AND CHILDREN.
By JOHN RUHRAH, M.D., Clinical Professor of Diseases of Children, College of Physicians and Surgeons, Baltimore. Third revised edition. 12mo volume of 534 pages, fully illustrated. Flexible leather, \$2.50 net. Philadelphia and London: W. B. Saunders Company, 1911. Canadian agents, The J. F. Hartz Company, Limited, Toronto.

This is a book primarily for students. The author, realizing the appalling number of pages that the medical student of to-day is supposed to read, has given to a comprehensive treatment of the diseases of children the virtue of brevity. The result is a compact, lucid survey of this subject. The book is bound in flexible, soft leather, and is a pleasure to handle.

TEXT-BOOK OF MASSAGE. By L. L. DESPARD, Member and Examiner Incorporated Society of Trained Masseuses. Very fully illustrated with anatomical drawings; pp. 290; price, \$3.25. London: Oxford Medical Publications, 1911. Toronto: D. T. McAinsh & Company.

This is a book of instruction for those desirous of taking up massage as a profession. It is accordingly divided into two parts, of which the first deals with the anatomy of the body, and the second, with the principles of massage. The book is copiously illustrated, and should be of value to those wishing some knowledge of the principles of this handicraft.

PRINCIPLES AND PRACTICE OF DERMATOLOGY. By WILLIAM ALLEN PUSEY, M.D., Professor of Dermatology, University of Illinois. Second revised edition; 1079 pages; 384 illustrations; 1 coloured plate. (1911). \$6.00. New York: D. Appleton & Company. Toronto: D. T. McAinsh & Company.

This is the second edition of this admirable work on diseases of the skin. There has been much recent development in this field of medicine, and Dr. Pusey has incorporated the most important in his book. Among the new topics considered are: gangosa, sporotrichosis, tinea intersepta, tinea albigena, brown-tail moth dermatitis, dermatitis from straw-mites, cestode larva in skin, cutis plicata, cutis verticis gyrata, dermolyses, paraffinoma.

Books Received

A MANUAL OF CYSTOSCOPY. By J. Bentley Squier, M.D., Professor of Genito-Urinary Surgery, New York Post-Graduate Medical School and Hospital, and Henry G. Bugbee, M.D., Instructor in Genito-Urinary Surgery, New York Post-Graduate Medical School and Hospital. Pp. 117; 26 original plates, 18 of which are coloured. Flexible leather; \$3.00 net. Paul B. Hoeber, 69 East 59th St., New York, 1911.

PROGRESSIVE MEDICINE: A Quarterly Digest of Advances, Discoveries, and Improvements in the Medical and Surgical Sciences. Edited by H. A. Hare, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College, Philadelphia, and L. F. Appleman, M.D. Vol. I, March, 1911. Price, \$6.00 per annum. Lea and Febiger, Philadelphia and New York.

THE HARVEY LECTURES, 1909-10. Delivered by Professors Richard M. Pearce, Otto Cohnheim, T. G. Brodie, G. Carl Huber, Ludwig Hektoen, Eugene L. Opie, Adolf Meyer, A. Magnus-Levy. Pp. 276, \$2.00 net. Philadelphia and London: J. B. Lippincott Company, 1910. Montreal agency, 608 Lindsay Building.

DISEASES OF THE ANUS, RECTUM, AND SIGMOID: For the Use of Students and General Practitioners. By Samuel T. Earle, M.D., Professor Emeritus of Diseases of the Rectum in the Baltimore Medical College. Pp. 476; 152 illustrations. Philadelphia and London: J. B. Lippincott Company, 1911. Montreal agency, 608 Lindsay Building.

PROGRESSIVE MEDICINE, Vol. I., March, 1911. A Quarterly Digest of Advances, Discoveries, and Improvements in the Medical and Surgical Sciences. Edited by Hobart Amory Hare, M.D., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. Octavo, 355 pages, with eighteen engravings. Per annum, in four paper-bound volumes, containing over 1,200 pages; \$6.00, net; in cloth, \$9.00, net. Lea & Febiger, publishers, Philadelphia and New York.

ATLAS OF MICROSCOPIC DIAGNOSIS IN GYNÆCOLOGY; WITH PREFACE AND EXPLANATORY TEXT. By Dr. Rudolf Jolly, Priv. Doc., Chief

Physician of the Gynaecologic Clinic, University of Berlin. Translated by P. W. Shedd, M.D., New York. Pp. 192 with 52 lithographs in colour, and two textual figures; cloth, \$5.50. New York: Rebman Company, 1123 Broadway.

MEDICAL DIAGNOSIS. By W. Mitchell Stevens, M.D., M.R.C.P. Pp. 1,571, with 177 illustrations. 25s. net. London: H. K. Lewis, 136, Gower St.

OUTLINES OF PSYCHIATRY. By William A. White, M.D., Washington, D.C. Third edition. 272 pages. \$2.50. New York: The Journal of Nervous and Mental Disease Publishing Company, 1911.

INEBRIETY: A CLINICAL TREATISE ON THE ETIOLOGY, SYMPTOMOLOGY, NEUROSIS, PSYCHOSIS AND TREATMENT, AND THE MEDICO-LEGAL RELATIONS. By T. D. Crothers, M.D., Superintendent Walnut Lodge Hospital, Hartford, Conn. Pp. 365. Harvey Publishing Company, Cincinnati, Ohio, 1911.

DISEASES OF THE NOSE, THROAT, AND EAR: MEDICAL AND SURGICAL. By W. M. Ballenger, M.D., Professor of Otology, Rhinology, and Laryngology, College of Physicians and Surgeons, Department of Medicine, University of Illinois, Chicago. Third edition, revised and enlarged. Pp. 983; 506 engravings and 22 plates; cloth, \$5.50, net. Lea and Febiger, Philadelphia and New York, 1911.

MILITARY SANITATION AND HYGIENE. By E. Blake Knox, B.A., M.D., D.P.H. (Hous.), Captain R.A.M.C. Pp. 346; 21, illustrations, 5s. net. London: Baillière, Tindall and Cox, 8, Henrietta St., Covent Garden, 1911.

CASE HISTORIES IN PEDIATRICS. A Collection of Histories of actual Patients, selected to illustrate the Diagnosis, Prognosis, and Treatment of the most important Diseases of Infancy and Children. By John Lovett Morse, A.M., M.D., Assistant Professor of Pediatrics, Harvard Medical School. Pp. 300, and several illustrations. Price, express prepaid, \$3.00. Boston: W. M. Leonard, 1911.

TRANSACTIONS OF THE AMERICAN UROLOGICAL ASSOCIATION. Edited by C. G. Cumston, M.D. Pp. 263. Riverdale Press, Brookline, Mass., 1911.

GOLDEN RULES OF DIAGNOSIS AND TREATMENT OF DISEASES. By Henry A. Cables, B.S., M.D., Professor of Medicine and Clinical Medicine of the College of Physicians and Surgeons, St. Louis. Pp. 298; Price, \$2.50. St. Louis: C. V. Mosby Company, 1911.

SPIROCHÄTES: A REVIEW OF SOME RECENT WORK WITH SOME ORIGINAL OBSERVATIONS. By W. Cecil Bosanquet, M.A., F.R.C.S. Illustrated; pp. 152; price, \$2.50 net. Philadelphia and London: W. B. Saunders Company, 1911; Canadian agents, The J. F. Hartz Company, Limited, Toronto.

WHAT TO EAT AND WHY. By G. Carroll Smith, M.A. Pp. 310; cloth, \$2.50 net. Philadelphia and London: W. B. Saunders Company, 1911; Canadian agents, The J. F. Hartz Company, Limited, Toronto.

A TEXT-BOOK OF MEDICAL DIAGNOSIS. By James M. Anders, M.D., Ph.D., LL.D., Professor of the Theory and Practice of Medicine and of Clinical Medicine, Medico-chirurgical College of Philadelphia, and L. N. Boston, A.M., M.D., Adjunct Professor of Medicine, of the same college. With 418 illustrations, and 25 plates, 17 of them in colours; pp. 1195; cloth, \$6.00 net, half morocco, \$7.50 net. Philadelphia and London: W. B. Saunders Company; Canadian agents, The J. F. Hartz Company, Limited, Toronto.

STUDIES IN CARDIAC PATHOLOGY. By George William Norris, A.B., M.D., Associate in Medicine at the University of Pennsylvania. Pp. 233; 85 original illustrations; cloth, \$5.00 net. Philadelphia and London: W. B. Saunders Company, 1911; Canadian agents, The J. F. Hartz Company, Limited, Toronto.

PRACTICAL CYSTOSCOPY AND THE DIAGNOSIS OF SURGICAL DISEASES OF THE KIDNEYS AND URINARY BLADDER. By Paul M. Hilcher, A.M., M.D. Pp. 398; 233 illustrations, 29 in colours; cloth, \$5.50 net. Philadelphia and London: W. B. Saunders Company, 1911; Canadian agents, The J. F. Hartz Company, Limited, Toronto.

THE CARE OF THE BABY. By J. P. Crozer Griffith, M.D., Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania. Fifth edition; pp. 455; illustrated;

cloth, \$1.50 net. Philadelphia and London: W. B. Saunders Company, 1911; Canadian agents, The J. F. Hartz Company, Limited, Toronto.

A MANUAL OF THE DISEASES OF INFANTS AND CHILDREN. By John Ruhrhah, M.D., Professor of Diseases of Children in the College of Physicians and Surgeons, Baltimore. Third edition; illustrated; pp. 534; flexible leather, \$2.50 net. Philadelphia and London: W. B. Saunders Company, 1911; Canadian agents, The J. F. Hartz Company, Limited, Toronto.

HOSPITAL MANAGEMENT. By Charlotte A. Aikens, formerly Superintendent of Columbia Hospital, Pittsburg. Illustrated; pp. 488; cloth, \$3.00 net. Philadelphia and London: W. B. Saunders Company, 1911; Canadian agents, The J. F. Hartz Company, Limited, Toronto.

1000 SURGICAL SUGGESTIONS: PRACTICAL BREVITIES IN DIAGNOSIS AND TREATMENT. By Walter M. Brickner, B.S., M.D., Adjutant Surgeon, Mount Sinai Hospital, with the collaboration of Eli Moschcowitz, M.D.; James P. Warbasse, M.D.; Harold Hays, M.D.; and Harold Neuhof, M.D., New York. Fourth American edition; pp. 227; cloth bound, semi de luxe, \$1.00; full de luxe, leather, \$2.25. Surgery Publishing Company, 92 William Street, New York City, 1911.

THE EXPERIMENTAL CHEMOTHERAPY OF SPIRILLOSSES (SYPHILIS, RELAPSING FEVER, SPIRILLOYSIS OF FOWLS, FRAMBŒSIA). By Paul Ehrlich and S. Hata, with contributions by H. J. Nichols, New York; J. Iversen, St. Petersburg; Bitter, Cairo; and Dreyer, Cairo. Translated by A. Newbold, and revised by R. W. Felkin, F.R.S.E. Pp. 181, with 34 tables in the text and 5 plates. New York: Rebman Company, 1123 Broadway.

CLINICAL SYMPTOMATOLOGY. By Alois Pick, Professor of Medicine, University of Vienna, and Adolph Hecht, Pediatrician, St. Anne's Hospital, Vienna. Translated under the supervision of Karl Konrad Koessler, M.D., University of Vienna. Pp. 833; price, \$6.00. New York and London: D. Appleton and Company; Canadian agents, D. T. McAinsh & Company, Toronto.

Res Judicatae

STAMMERING

STAMMERERS from time immemorial have been jeered at, and their trouble treated as a joke, while for treatment they have been relegated to the tender mercies of quacks. Physicians who do not include patent medicines in their pharmacopœia recommend without hesitation treatment by a secret process, of which they know nothing, and about which even the patient is sworn to secrecy. Cures, often temporary, gained by these methods are trumpeted abroad, while the countless failures are never heard of. Experience shows that there is one method, and one method only, whereby stammering can be cured; namely, by a complete reeducation of the centres of speech, a process which demands, first and foremost, a course of development of mental control, and in the second, certain vocal and physical exercises.

It must be realized, in the first place, that stammering is not due to any organic disturbance of the speech centres, but is a functional disturbance, or, more accurately, a lack of coördination between the various associated centres controlling speech, and thus the cure must be based upon the establishment by rational methods of the lacking coördination.

While the mental attitude towards speech is the same in all stammerers, they have always been classified by the outward means they employ to make themselves understood. There is the nervous, high-strung person, hardly to be called a stammerer, who becomes practically speechless when under great excitement, and who may, if brought into contact with stammerers, contract the habit. This is the only hereditary tendency in stammering, if it can be called such. Some persons have difficulty in finding words to express themselves, their minds move slowly, and a hesitating manner may develop stammering if much in the company of stammerers. Too rapid speech may have the same effect, and in the treatment of this condition the speech must be developed accordingly. A rapid thinker and speaker must learn to speak and think slowly, and vice versa. These defects are, of course, often found in those who do not stammer, and are largely due to poor methods of education. Again, there is the lisp, the improper use of the lips in articulation, caused, sometimes, by that "baby talk"

which parents are so fond of encouraging and which is frequently the rudimentary stage of stammering.

From these less severe conditions, we pass to the more serious, the so-called stuttering, about which, while the patient is aware that he stammers, he does not worry and takes no steps towards being cured; and also the stammerer who does not know that he stammers unless reminded of it. These may be called chronic cases and are most difficult to deal with.

The painful muscular efforts and mental distress caused by the difficulty of articulation, give rise to many obscure symptoms, such as acute diarrhoea, cystitis, and, in women, to various gynaecological conditions. It is well to watch patients of a low mental grade for signs of sexual abuse.

Some of the methods employed by the so-called schools for stammerers cannot be altogether condemned, as in many cases, in fact in nearly all, there is an improvement, sometimes an apparent cure. There is, occasionally, an actual cure. Some stammerers are helped by a trifling mechanical action, such as beating time, drawing a long breath, or holding the voice to a monotone. Such methods are valuable as far as they go, and it is upon these physical exercises that the schools rely. So long as the patient is diverted by keeping his mind upon them as a means of cure, they will be of great assistance to him, but once they become natural, unconscious acts and are performed as such by the patient, their usefulness ends and the stammerer is worse than before, morbid, hopeless, and depressed.

Saying this, however, does not mean that stammering is incurable. On the contrary, there is a rational method of treatment which, if persevered in, is sure to meet with success. It is a treatment applicable to all cases and forms of this condition, the only difference being in the individuals treated and in their capacity to assume the correct mental attitude. This lies principally in the hands of the teacher, and constitutes the chief difficulty in procuring suitable persons to undertake the treatment of this neurotic condition, the degree and extent of which can be appreciated only by those who have experienced it or been brought into close contact with it. Institutional treatment is imperative in all cases. The constant presence of friends and relatives who are accustomed to the patient's imperfect speech, and before whom he relaxes any effort he may be making towards speech control, is most injurious.

During the first few weeks of treatment the pupil should be solely in the company of the teacher, and afterwards, as the cure progresses, he should be in constant touch with those who understand and sym-

pathize with him, and are able and willing to assist him to avoid the many pitfalls which are waiting to entrap him.

It being recognized that a correct mental attitude or reeducation of the centres of speech is the cure for stammering, which cure must be worked from the conscious to the sub-conscious mind, it may be seen that both time and patience on the part of teacher and pupil will be needed. Some cases take much longer than others, being dependent upon the ability of the patient to grasp the idea of the mental attitude, and of the teacher to get into perfect accord with his pupil. Normal speech is an unconscious mental act: stammering is a self-conscious one.

The greatest factor in the cure of stammering is the elimination of fear from the mind. The very thought of stammering must be put far from the pupil; he must be impressed that "the coward dies a thousand deaths, the brave but one," and encouraged in every way. In from six months, for mild cases, to two years, for a very severe case, the pupil should be able to speak perfectly, severe cases in this instance meaning not necessarily a severe stammerer but one who finds difficulty in adjusting his mind to the proper mental attitude. He may not have complete, natural, unconscious speech, but with increasing confidence and strengthening will power, that will come in time.

Until absolutely unconscious, natural speech is attained, relapses are sure to occur, but will grow less and less frequent and eventually disappear. The greatest difficulty in treating a relapsed patient, is his discouraged and despondent state of mind. To obviate this the teacher must be in complete accord with the patient, keeping continually before him that all who stammer can be cured, even those who have become mentally unsettled by the stammering itself.

During treatment, the patient must hear only perfect speech. A proper environment is most important. Complete silence should be observed for a month or six weeks except during treatment. He must not even talk to himself, a peculiarity often noticed in such cases. During this time he must exert great mental effort in keeping his mind free from fear and upon perfect speech. This is the most difficult part of the treatment, but patience and perseverance effect wonderful results. He must not let himself think of stammering. Just before going to sleep let him fix his mind upon perfect speech, and the feeling of perfect speech; after continued practice the conscious mind will work upon the unconscious, producing a condition of self-hypnosis.

During this time the patients are taken individually by the instructor and taught deep-breathing exercises, inflating the chest, and forcing down the diaphragm. While holding the breath, they exercise on the five vowels, using the open throat, Italian singing method. A mistake

is made in telling patients to take a long breath and speak while exhaling. Let them take a deep breath and speak while holding it, keeping the mind away from the fact that it is slowly leaving, which tends to make them panic stricken. The contracted chest and severe muscular efforts of stammerers, so distressing to witness, are due to this effort to speak after the breath has been entirely exhaled. During these exercises let the facial expression be calm and placid and the mind kept upon the play of sound upon the vocal cords, as upon a musical instrument. No one stammers while singing, and during these exercises the pupil will not stammer. After a longer or shorter period he may practise modulating the voice in the chest register, which must be strictly adhered to during the entire treatment.

At the end of this preliminary training, which may occupy about six weeks, let the pupil and teacher practise writing with the left, instead of the right, hand. This requires conscious mental effort, which is quite noticeable to both teacher and pupil, frequently causing them to lose sight of the end, in their concentration upon the means. The case is distinctly parallel to the mental attitude required of the patient undergoing reëducation.

In addition, as Dr. Makuen, of Philadelphia, has observed, "In a general way, the stammerer should learn the 'physiologic alphabet' theoretically as well as practically. He should learn exactly how to produce and articulate, if you please, every one of the elementary sounds of speech, and should learn to hear them accurately and know when he himself produces them accurately. In other words, he must develop his ear for speech before he can make any progress in speech culture. He must also learn the exact musculature of speech, and when an untoward action or coördination appears in any of the three peripheral mechanisms, it should be pointed out to him, and suitable exercises given to correct it. In this way the patient gradually learns how to regulate his nervous energy, how to inhibit certain hitherto overacting nerve impulses which have resulted in the muscle spasms characteristic of stammering, and how to distribute the innervations to the various mechanisms in their proper order and intensity."

By now the patient will have acquired a certain amount of confidence in himself, and may begin to articulate slowly the vowels in a monotonous, slurring voice. He may also practise words beginning with "ah," holding the chin well in. After a time he may, while practising, gradually lower and raise the voice, as in speech. Some words and numbers he will find more difficult to pronounce than others. At this stage they must be avoided. He may now read aloud, very slowly, in a monotone. Gradually raising and lowering the voice while

reading, may next follow. By this time the cure should be well advanced. When any fear or thought of stammering intrudes, let the patient stop what he is doing or saying, and begin something quite different. Let him later revert to what has caused the difficulty, and repeat it several times. Every word overcome in this way is a distinct advance. As self-confidence increases conversational exercises may be begun, first with the teacher, finally with strangers. The patient must take up elocution, when he can converse fairly well, as well as deportment, calisthenics, chest development, and anything that tends to give self-confidence when meeting the public.

One of the easiest mental exercises is to concentrate the mind upon a tune. A nervous person who can scarcely speak before strangers, can frequently give clever impersonations and act in character, and stammerers generally find that they can talk better while listening to music, or during similar occupation of the conscious mind. This tendency is much used in this treatment by talking in a monotone, or singing voice, or in any way altering the natural voice, speaking, as it were, "in character."

Important as the physical treatment is, it is entirely subservient to the mental. The mind must be trained to forget itself, and concentrate upon the perfect speech which, sooner or later, will reward courage and perseverance. That the general health must be carefully attended to during the training goes without saying,—regular hours, abundance of fresh air and sleep, and freedom from worry, as well as careful dieting and avoidance of stimulants. The general treatment for neurasthenia suits the case.

"**THERE** are comparatively few literary records comparable to that of Dr. S. Weir Mitchell, who, in his eighty-third year, has just published his latest novel, '*John Sherwood, Ironmaster*', which shows no falling off in his power of writing and of holding his reader. When it is remembered that he has been easily among the first of American neurologists in a specialty which is more comprehensive perhaps than any other and requires immense professional industry of the man who maintains himself in it as Dr. Mitchell has done, his literary ability and activity are notable phenomena. He is probably one of the oldest, if not the oldest, of living productive literary men; and this fact, to say nothing of the professional activities he may still keep up, makes his latest achievement the more remarkable. Everything he does is done well."—*The Journal of the American Medical Association*.

Retrospect of Surgery

A GENERATION OF SURGERY

OUR warfare is world wide and unceasing, our fighting line deploys on every meridian and in every latitude, our columns keep step with the procession of the years. But it is not a monotonous march. Persons and events rise to prominence, there are famous camping grounds, there are weary sieges, there are trying defeats, there are glorious victories.

The publication a few weeks ago of the collected writings of Lord Lister, marks, to my mind, an epoch in the history of surgery. These volumes owe their origin to the desire of his followers to signalize in some fitting way the occasion of his eightieth birthday, but unavoidable circumstances have delayed their appearance for two years. Here we have traced for us by the master's own hand the development of a system which has revolutionized our art, and, more important still, we have the principles of physiology and pathology on which that system was based.

A consideration of this unique *Fest-schrift* and of the memorable period which it represents, suggests a review of the changes which have taken place in surgery during the past generation.

A generation is generally understood to mean a period of about thirty years, a period which covers the phase of maximum activity of most men, and I may also confess that a personal equation helps to determine my choice of this period, as it corresponds with that in which I have been permitted to practise my profession. I therefore look back to the year 1879. Many things have contributed to the great and beneficent changes in surgery during these thirty years.

The gradually accumulating mass of clinical experience, illuminated by light from many sciences; more minute and systematic autopsies; experimental pathology and operations on animals, have been of immense service, but nothing has been so profound and far-reaching an influence as the adoption of the principles and methods introduced by Lister; indeed, without these principles and methods, experimental pathology and surgery could scarcely have an existence. Our predecessors who were retiring from practice thirty years ago had good

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reason to be pleased with the work of their generation, famous for the introduction of anæsthesia. But few of them knew that they were on the threshold of an even greater advance in the service of humanity, in the development of antiseptic surgery.

First, then, because homage must be done to the master-mind which during a life time has stamped a new character on surgery, I would consider the view taken of Lister and his methods a generation ago. For over ten years Lister had been the solitary herald of a new day, but the dawn came very slowly. I think that the year 1879 was, in some respects, a momentous year for him. There were many, no doubt, who had been impressed and convinced by the arguments and the results of Lister; torches had been lit at the shrine in Edinburgh, and were shining here and there like good deeds in a naughty world. In Denmark, Germany, and America there were enthusiastic disciples, but the bulk of the profession in England, and, notably, most of the leaders in surgery, were sceptical, if not hostile. The climax came when Mr. Savory, of St. Bartholomew's Hospital, in the address on surgery at the meeting of the British Medical Association in Cork, in 1879, a master of vigorous rhetoric, and fortified by excellent statistics of the practice of his famous hospital, undertook to expose the pretensions of the new surgery and to demolish its foundations.

At a discussion in Paris in the same year one of the leading surgeons poured the vials of his scorn on Lister's methods, and with a touch of Chauvinism protested against the introduction of these "foreign methods" into France, methods which he characterized as a "veritable epidemic of antiseptics." But the change was at hand. Mr. Savory's elaborate attack may be regarded as the last serious attempt to discredit Lister's system. There was a memorable debate in London in the autumn of 1879 on antiseptic surgery, in which it was evident that the best thinkers, the most scientific surgeons, were on Lister's side. And the International Medical Congress in Amsterdam in that year set its stamp of approval on the hero and his work in the remarkable enthusiasm with which it greeted him, an ovation unparalleled in the annals of science, when the vast assemblage rose to its feet cheering tumultuously. There must have been some solace for the anxieties and discouragements of the long fight with "custom, prejudice, disease," when the president, the venerable Donders, took his hand, saying, "It is not only our admiration we offer you, it is our gratitude, and that of the nations to which we belong." This was the judgement of international surgery thirty years ago, and it has echoed and re-echoed round the world.

Those of us who can look back on surgery for thirty or forty years see vast changes. We scarcely understand

old hospitals, in days when there were no electric lights, no telephones, no elevators. The equipment of a modern operating room would be a revelation to the great operators of the past. The wonderful discovery of Röntgen, too, has made diagnosis and treatment certain in cases which, a generation ago, would have been doubtful. A large part of the equipment of a modern hospital consists of apparatus for antiseptic treatment, not thought of in hospital construction thirty years ago.

The methods of securing an aseptic condition in wounds, and the dressings used, have been subject to many changes during the past thirty years. At that time only a very small number of surgeons considered this question at all, a question which soon came to stand first in importance. This is not the occasion for a discussion of the various methods of antiseptic surgery. I use the term antiseptic designedly, for we cannot have an aseptic wound without the use of antiseptic methods. The carbolic spray, which to many careless thinkers of the last generation was the essential element in Lister's method, has long ago been given up, but when I find his antiseptic methods characterized, as I did a few days ago in reading an article on the treatment of wounds, as "crude," I feel that a better term might have been used. There was nothing crude or ill-considered in what Lister did. His methods, including the spray, were firmly based on the scientific knowledge of that day, and were carried out with all the precision of exact science as well as the simplicity of the highest art. And no antiseptic has yet been devised superior to carbolic acid for all the purposes of the surgeon. It can be used to disinfect the hands, the field of operation, the dressings, and the instruments. It has its disadvantages, but its substitutes have more. One of its great advantages is its power of penetrating fatty substances, so that a single, thorough washing with a solution of one part of carbolic acid in twenty of water is as efficacious as the repeated applications of soap, ether, alcohol, and bichloride of mercury, so frequently used.

But, whatever methods may be employed, there is a vast difference from the procedure common thirty years ago. I saw a young man come to the out-patient department of a London hospital in 1878 with a large periosteal abscess over the mastoid. He had the appearance of having come directly from his work, unkempt and grimy. The surgeon, unperceived by the patient, took a bistoury out of his waistcoat pocket, a bistoury made like an ordinary clasp knife, opened it, and without more ado, plunged it into the abscess and while the hapless youth hopped about in pain and surprise, directed him to go home and poultice it. And I saw worse things than this.

In another detail a great change has taken place, and that is in the

more thorough haemostasis practised in operations. Thirty years ago two or three pairs of artery forceps were considered amply sufficient for the operation of removal of the breast, where three or four dozen are required to-day.

There is no doubt that Lister's antiseptic method required more time and care than many surgeons seemed willing to give, but surely life and limb were worth it, if the results were better. Some men exaggerated the difficulties of antiseptic surgery, and one leading teacher characterized the difficulties as insurmountable. Yet, while he spoke, Carl Reyher, a young German surgeon serving with the Russian army in the Caucasus, who had surmounted the insurmountable by a few weeks' study in Edinburgh, was employing Lister's methods on the battlefield with the audacity of youth and the confidence of science, and with a success which had never before been seen; the severest compound fractures, and even knee joints perforated by rifle bullets were dressed antiseptically and healed. The fact was that a new world was opening before us and not only were the ordinary operations of surgery made more successful, but surgery was extending in directions that had hitherto seemed impossible.

Mr. Savory and his friends asked for statistics and at first sight it seemed a reasonable demand. But if statistics are to be compared they must deal with similar materials. The operations of Savory and of Lister were in different categories. How many surgeons were there in 1879 who would open a psoas abscess, or open a healthy knee joint to remove a displaced cartilage or to wire a fractured patella? Savory and Spence were justly proud of their results in amputation. Lister might be prouder, for he had few to show. Shattered limbs, which, according to all the canons of surgery as it was thirty years ago, would have been material for ingenious operations by the house surgeon and his myrmidons, were stoutly supporting their owners, or welding the hammer, steering the boat, guiding the plough, and earning the "bairnies' bread." There is no comparison between the most artistic stump and a serviceable limb.

Surgery had made great strides, and was proud of the appellation conservative, but even those who followed Lister scarcely dared to dream of the life-and limb-saving potentialities of surgery as it is to-day. Lister was indeed voyaging alone through strange new seas of thought and action. The exploration of joints, the suture of blood vessels, the open treatment, by wiring, of simple fractures in special cases, the resection and anastomosis of bowel for gangrene in strangulated hernia, were looked on as daring, and by some as unwarrantable, experiments, but such operations are a large part of the surgery of to-day.

The reproach and tragedy of surgery in those days was the uncertainty which characterized the results of operative treatment. Mere operative skill, as seen in amputations, excisions, and the ligature of the larger arteries, was probably never of a higher order than in the days of Syme and Nelaton, and yet results were unexpectedly disappointing. It was Lister who showed that the inconstancy of results, the disappointing failures, were due to the maleficent action of germs. It was he who cancelled suppuration as a factor in surgery. Our fathers looked with placid satisfaction on suppurating wounds and discoursed pleasantly of "laudable pus." How far removed from the chagrin, mortification, and disquietude of mind of the surgeon of to-day who discovers suppuration in any wound he may have made!

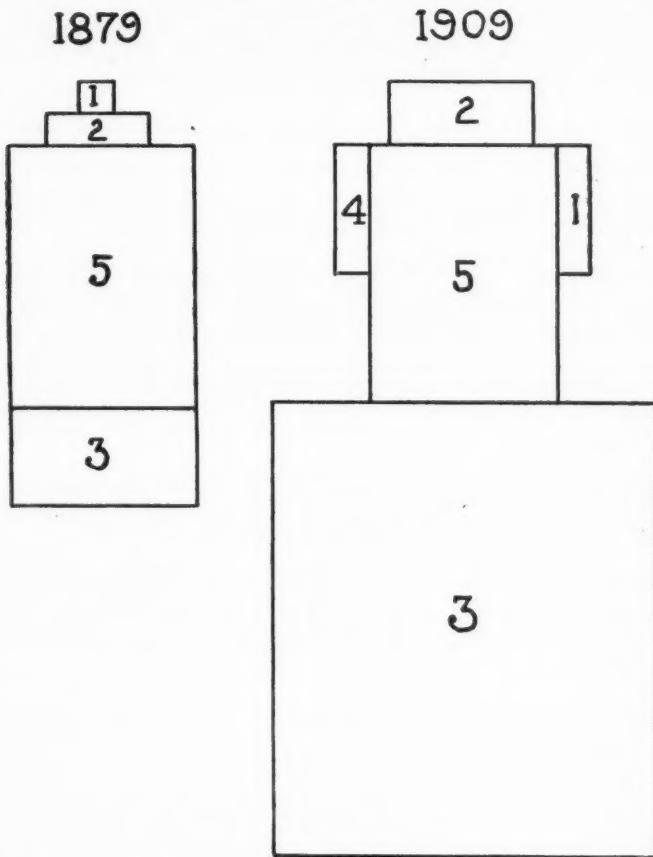
These microbial diseases were responsible for the great majority of the fatalities in surgery. They appeared and disappeared with perplexing uncertainty, and they were uncontrollable. A fearful example was the case of the Munich hospital in the early seventies, when eighty per cent. of all cases were attacked. Think of it! Eighty per cent. of all wounds, operative as well as accidental, affected with blood poisoning in the form of erysipelas, pyæmia, or hospital gangrene. The mortality was appalling; every amputation died; the hospital was a pest-house; they were about to close it or pull it down. Then Lister's methods were introduced, and with no other change whatsoever, the black record came to an end. It was as if the Angel of Mercy had spread her white wings over the place and fanned that sickly air, and ancient forms of foul disease had fled forever. No wonder that Nussbaum, heartbroken with the terrible fate of his patients, and perhaps unconsciously comparing these triumphs of peace with the fierce struggle for nationhood through which his country had just passed, "felt moved as with the solemn joy of a great victory." It was a great victory. It was Lister's victory. He conquered wound-infection and made surgery "sweet with certainties."

The generation which saw and shared in the victory is passing away and the new generation knows little of the struggle. But in the remarkable volumes to which I have referred they may find the principles which made the victory possible.

ADDENDUM

These statistical diagrams, drawn to scale, illustrate the extension of operative surgery during the past thirty years. They do not represent the actual operation-statistics of any hospital, but are compiled from papers and case reports published in the *Lancet*, Vol. I, for 1879 and 1909, and are an index to the general advance in surgery and to the change in the type of cases which interest surgeons and seem worthy

of publication. Amputations, for example, have now become so uneventful that few cases seem of sufficient importance to record in the medical press. The noteworthy point is the vast increase in those operations which involve the opening of the peritoneal cavity: 1. Operations involving the pleural cavity,—ratio of advance, 1879-1909, 1:4. 2. Cranial and spinal surgery,—ratio, 3:10. 3. Operations



involving the peritoneum,—ratio, 3:28. 4. Operations on bones and joints such as osteotomy, wiring simple or ununited fractures, exploring healthy joints for foreign bodies, etc.,—these only appear after 1879. 5. All other operations, such as amputations, excisions, removals of the breast, in which the ratio is unchanged.

Personal

DR. A. D. BLACKADER, of Montreal, has been elected president of the American Climatological Association.

DR. A. HOWARD PIRIE, of St. Bartholomew's Hospital, London, England, has been appointed to the x-ray and medical electrical department of the Royal Victoria Hospital, Montreal.

DRS. GALLIE, Canfield, McKenzie, and Oille have returned from Europe.

DR. H. B. ANDERSON has returned from Vienna.

DR. DUNCAN GRAHAM, late of Pittsburg, has returned from Germany, and will fill the position of lecturer in bacteriology in succession to Dr. Fitzgerald in the University of Toronto.

THE laboratory of the provincial Board of Health has been removed from the medical building to new quarters in Queen's Park, Toronto.

THE formal opening of the new building of the Academy of Medicine, Toronto, has been postponed till September.

DR. GEORGE S. BINGHAM sustained severe injuries in a street railway accident, when a car collided with his carriage. He is now in St. Michael's hospital suffering from a compound fracture of the left leg.

DR. N. A. POWELL will spend a week with Dr. Howard Kelly on the Magnetewan.

News

THE pathological wing of the new Toronto General Hospital will be completed and ready for occupation October 1st, 1911.

THE sixty-sixth annual report of the Montreal Maternity Hospital

shows that during 1910 there were seven hundred and fourteen admissions to the hospital, of which, with the twenty-nine remaining from October 1st, 1909, seven hundred and three were treated to a conclusion. The average stay of each patient in hospital was 17.63 days. Of those treated six hundred and ninety-seven were discharged in good condition, four were transferred to other hospitals, and two died. There were six hundred and sixteen confinements, eleven twin pregnancies, twenty-seven still-born, and thirty-one babies who died in hospital. Of the six hundred and twenty-seven births in hospital, five hundred and sixty-nine babies were discharged in good condition, the deaths making a rate of nine per cent.

MCGILL UNIVERSITY has received from Lady Graham, the honorary treasurer of the Dr. A. A. Browne Memorial Fund, the sum of \$10,000, which is to be devoted to the establishment of a fellowship to be called the A. A. Browne Memorial Fellowship. The fellowship is to be for the advancement of medical science. The holder of the fellowship is to be chosen from time to time by the faculty of medicine. In addition to the above-mentioned sum, the university has also received from the subscribers to the memorial fund a medallion portrait of the late Dr. Browne, which has been placed in the library of the new medical building.

THE second meeting of the Clinical Congress of Surgeons of North America will be held this year in Philadelphia, November 7th to 16th, inclusive. Surgical clinics in all branches of surgery will be conducted from eight a.m. to five p.m. daily during the ten days' session. These clinics will be given by the leading surgeons of Philadelphia, representing all the teaching faculties in both undergraduate and graduate schools. The clinics will be conducted in the private operating rooms and large public amphitheatres of the private and public hospitals, aggregating a seating capacity of more than two thousand. Evening meetings are being arranged under the supervision of Dr. George E. de Schweinitz, president of the College of Physicians of Philadelphia. Meetings on six evenings have been provided. Papers and discussions will be given by the leading surgeons of America and Europe. Invitations will be issued to the physicians who may be interested to attend the Philadelphia meeting and who desire to become members of the congress, if their names and addresses are sent to the general secretary. There are no yearly membership dues from the members of the congress. A nominal registration fee to cover the administration expenses will be required of each member actually attending the meeting, which will entitle him

to a ticket admitting him to all clinics, evening meetings, and social functions prepared for the congress. All communications of inquiry in regard to the congress should be addressed to Dr. Franklin H. Martin, general secretary, 1210 Columbus Memorial Building, Chicago.

A MEETING of British pathologists interested in medical museums was recently called by Dr. Osler in London, and the gathering was addressed by Dr. Maude Abbott, of Montreal, the secretary-treasurer of the International Association of Medical Museums. Dr. Abbott, in reviewing the history of this movement, pointed out that since the organization in 1906 four meetings have been held, an exchange department has been established, and also an experience department for the interchange of information on points of mutual interest. A yearly bulletin is now published. The membership has increased rapidly, and includes representatives in Africa, Australia, and South America, as well as in the principal countries of Europe and North America. The latest step has been the organization of local European centres under the control of a corresponding member in France, Germany, Holland, and Belgium, through which exchanges are to be transacted locally. It was decided that arrangements be made for a meeting of the association in conjunction with the meeting of the International Congress of Medicine in London, in 1913.

THE twenty-eighth annual meeting of the American Climatological Association was held at the Windsor Hotel, Montreal, June 13th and 14th. The meeting was well attended. At the closing session Dr. A. D. Blackader, of Montreal, was elected president for the ensuing year in recognition of the active interest he has taken in its work. Dr. Blackader is the first Canadian to hold this office.

Two brass tablets were unveiled recently in the hallway of the Western Hospital, Montreal, commemorative of two men whose devotion had much to do with the present success and prosperity of that institution,—one to the late Dr. Francis Wayland Campbell, dean and professor of medicine in the University of Bishop's College and a physician to the Western Hospital from its foundation in 1876 until his death in 1905, and the second to the late Dr. William Henry Drummond, first a pupil and later a fellow-professor with Dr. Campbell, and also a friend as well as a physician-in-waiting to the hospital. The two tablets were engraved as follows:

IN Memory of

Francis Wayland Campbell, M.A., M.D., B.C.L., Dean and Professor of Medicine University of Bishop's College and Surgeon Lieut.-Col. Royal Regiment Canadian Infantry. Physician to the Western Hospital from its foundation in 1876 until his death, and to whose enterprise and generosity its inception and its early existence is mainly due. This tablet has been here placed by his fellow members and former pupils in the Faculty of Medicine.

Born 1837.

Died 1905.

In Memory of

Dr. William Henry Drummond for many years connected with the Western Hospital.

THE recommendation of the health branch of the commission on conservation for the establishment of a national laboratory and the creation of a Dominion council on public health has been approved. The chief object in establishing the laboratory is to secure cheaper and purer supplies of vaccines, anti-toxines, etc. The duty of a Dominion council will be to advise both Dominion and provincial governments as to matters affecting public health.

THE Italian Society of Internal Medicine will hold its twenty-first congress at Turin, October 9th to 12th, 1911. The subjects proposed for discussion are, progressive pernicious anaemia, the diagnosis of diseases of the pancreas, visceral arterio-sclerosis, and intravenous medication.

The Far Eastern Association of Tropical Medicine announces that the second biennial congress will be held at Hongkong, China, January 20th to 27th, 1912, under the presidency of Dr. J. Mitford Atkinson, Hongkong. The general classification of the work of the congress is included in the following groups of subjects:—
1. Protozoology, helminthology. 2. Cholera, plague, leprosy, tuberculosis. 3. Tropical fevers, malaria, beri-beri, dysentery. 4. Surgery, obstetrics, infantile diseases. 5. Climate, hygiene, sanitation. It is requested by Dr. Francis Clark, secretary-treasurer general, Hongkong, that abstracts in English of papers be forwarded to him as soon as convenient. Papers may be read in English, French, or German.

A CHANGE has been announced in the date set for the seventh

International Congress of Dermatology and Syphilology, to be held at Rome. To suit the convenience of many members, the date of meeting has been put forward a week. It will consequently be held from September 18th to 23rd, 1911, instead of from the 25th to the 29th.

AT a meeting of the Board of Governors of McGill University a resolution was adopted acknowledging Lord Strathcona's latest gift of \$100,000 to make the equipment of the new medical building complete in every way. It was announced that Dr. F. J. Shepherd had consented to continue in the deanship of the faculty of medicine for a further period of two years. The resignation by Dr. J. Wilkins of the professorship of medical jurisprudence was submitted and accepted, the secretary being directed to convey to Dr. Wilkins the board's high appreciation of his long and valuable services as a member of the faculty of medicine. Dr. J. D. Evans was appointed assistant professor of obstetrics, while Dr. Oskar Grüner, of the Royal Victoria Hospital, and Dr. Lawrence J. Rhea were appointed assistant professors of pathology.

THE third international congress for the study of questions relating to infantile mortality and the protection of infant life will be held at Berlin, September 11th to 15th, 1911, under the patronage of Her Majesty the German Empress. In addition to scientific discussions, the programme will include an inspection of the measures taken in Berlin for the reduction of infantile mortality as well as a visit to the International Hygiene Exhibition in Dresden, where a special department is being devoted to infant hygiene.

THE seventh International Congress of Criminal Anthropology will be held at Cologne in October, 1911. The official languages of the congress are German, French, English, and Italian, but it is requested that, if possible, only German or French should be used in the discussions. Among the subjects proposed for discussion are the influence of tendency and environment on crime; the morphology and psychology of the primitive races of man; the present state of criminal psychology; morphological abnormalities, especially of the skull, in relation to the legal view of responsibility; the treatment of so-called diminished responsibility; the prison system; accommodation for dangerous lunatics. A number of papers will also be read. In connexion with the congress

there will be an exhibition of objects relating to criminal psychology, such as models and plans of institutes, safety appliances, apparatus for the examination of patients, literary and other works of patients, weapons and instruments for breaking loose. All information as to the congress will be supplied by Professor Aschaffenburg, 130, Stadwaldgürtel, Cologne Lindenthal. Communications as to the exhibition should be addressed to Staff Surgeon Dr. Partenheimer, Psychiatrische Klinik, Cologne. Those who intend to take part in the congress are requested to send their names to Dr. Brüggemann, Psychiatrische Klinik, Cologne.

Obituary

DR. GEORGE A. HETHERINGTON, of St. John, N.B., died June 14th, from injuries received by falling down an elevator shaft. Dr. Hetherington was born at Johnston, N.B. After receiving his elementary education in the schools and colleges of his native province he spent two years in the medical department of the University of Michigan, when he was appointed resident physician of Washtenaw Asylum, which position he held for a year.

In 1876 he graduated from the Cincinnati College of Medicine and Surgery. After some years spent in practice in New Brunswick, Dr. Hetherington spent some time in post graduate work in Edinburgh and Dublin, taking up practice in St. John on his return in 1882. In 1896 he was appointed Superintendent of the Provincial Lunatic Asylum.

He was a member of the British Medical Association, a life fellow of the British Gynaecological Society, Maritime Medical Society, and the St. John Medical Society. He also served as coroner in the city and county, and was commissioner of the General Public Hospital and lecturer to the school for nurses. In addition to his professional duties, Dr. Hetherington took an active part in general affairs. He served a number of years on the school board; was one of the original directors of the exhibition association; and had received the long service decoration of the 62nd St. John Fusiliers, in which regiment he had served as lieutenant, captain, and paymaster.

DR. J. L. FORTIER died June 8th, at Waterville, Me. Dr. Fortier was born at St. Sylvestre, Quebec, in 1853. He received

his preliminary education in the province of Quebec, and graduated from the Maine Medical School in 1880. Dr. Fortier was one of the best known practitioners in the New England States. He was president of the French Historical Society of Boston.

Canadian Literature

ORIGINAL COMMUNICATIONS

The Canadian Practitioner and Review, June, 1911:

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| Diagnosis of Enlargement of the Prostate | Edmund E. King. |
| Vincent's Angina | Murray McFarlane. |
| The "Side-Step" in Medicine | John Hunter. |
| Hospitals for Inebriates—A Cottage Hospital for
Toronto | A. M. Rosebrugh and R. H. Coleman. |

The Canada Lancet, June, 1911:

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| Excessive Blood Pressure—A Promising Sphere of
Preventive Medicine | Arthur Birt. |
| Pelvic Findings in the Female Insane, with Results
Following Treatment | E. A. Hall. |
| Medical Thoughts, Facts, and Foibles . | James S. Sprague. |

L'Union Médicale du Canada, June, 1911:

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| Tumeur royale en gibecière de la région lombo-
fessière | Amedée Marien. |
| Grippe et puerpéralité | E. A. René de Cotret. |

Le Journal de Médecine et de Chirurgie, June, 1911:

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| Le "606" guérit—il la syphilis? | Gustave Archambault. |
| L'utérus gravide incarcéré | Charles Saint-Pierre. |
| Oto-rhino laryngologie | Paul Bousquet. |

Le Montreal Medical, June, 1911:

Traitemenent de la tuberculose par l'iode-menthol-radio-actif S. Bernheim and L. Dieupart.

Dominion Medical Monthly, July, 1911:

The Relationship between the Ductless Glands and Carbohydrate Metabolism . Thomas B. Futcher.
Brain Tumor Graham Chambers.
Medical Thoughts, Fads, Facts, and Foibles
James S. Sprague.

Medical Societies

VALLEY MEDICAL SOCIETY

THE annual meeting of the Valley Medical Society was held in Middleton, N.S., on Friday, June 15th. After the usual business had been transacted, the following officers were elected for the ensuing year: president, Dr. J. A. Sponagle, Middleton; vice-president (one for each county), Drs. W. B. Moore, Kings; W. F. Read, Annapolis; L. H. Morse, Digby; secretary-treasurer, Dr. V. F. Connor, Hantsport. No papers were read on account of the Maritime Medical Association meeting. It is proposed to hold a joint session with the Colchester-Hants society at Hantsport early in September.

ACADEMY OF MEDICINE, TORONTO

At the annual meeting of the Toronto Academy of Medicine, held on Tuesday, May 2nd, the election of officers for the ensuing year resulted as follows: Members of Council: president, Dr. N. A. Powell; vice-president, Dr. R. A. Reeve; hon. secretary, Dr. Harley Smith; hon. treasurer, Dr. W. A. Young; past president, Dr. A. A. MacDonald. Chairmen of Sections: medicine, Dr. Graham Chambers; surgery, Dr. H. A. Bruce; pathology, Dr. J. J. Mackenzie; ophth., laryn., etc., Dr. Charles Trow; state medicine, Dr. T. W. S. McCullough; pediatrics, Dr. J. T. Fotheringham. Elective Members of Council: Drs. John Ferguson, W. J. O. Malloch, H. J. Hamilton, J. F. W. Ross, W. A. McKeown, A. McPhedran, F. N. G. Starr, E. E. King.

Medical Societies

ASSOCIATION DES MÉDECINS DE LA LANGUE FRANÇAISE DE L'AMÉRIQUE DU NORD :

President—Dr. H. Hervieux, Montréal. Secretary—Dr. E. P. Chagnon, Montréal.

Meets every second year, next reunion in August, 1913, at Montreal.

ASSOCIATION MÉDICALE C. F. DE MANITOBA :

President—Dr. J. M. O. Lambert. Secretary—Dr. G. A. Dubuc, St-Boniface, Man.

ASSOCIATION MÉDICALE DE L'OUEST DE MONTRÉAL :

President—Dr. E. G. Asselin. Secretary—Dr. Aumont, St-Henri.

ASSOCIATION MÉDICALE DU COMTÉ DE JACQUES-CARTIER :

President—Dr. P. A. Valois. Secretary—Dr. Beaujolin, Lachine.

ASSOCIATION MÉDICALE DU COMTÉ DE PORTNEUF :

President—Dr. A. Larue Secretary—Dr. Thos. Savary, Pont-Rouge.

ASSOCIATION MÉDICO-CHIRURGICALE DU DISTRICT DE JOLIETTE :

President—Dr. C. Bernard. Secretary—Dr. A. Roch, St-Gabriel de Brandon.

SOCIÉTÉ MÉDICALE DE CHICOUTIMI ET DU LAC ST-JEAN :

President—Dr. Poliquin. Secretary—Dr. A. Riverin, Chicoutimi.

SOCIÉTÉ MÉDICALE DE MONTMAGNY :

President—Dr. Gosselin. Secretary—Dr. Paradis, Montmagny.

SOCIÉTÉ MÉDICALE DE QUÉBEC :

President—Dr. D. Brochu. Secretary—Dr. J. Dorion, Québec.

SOCIÉTÉ MÉDICALE DE RIMOUSKI :

President—Dr. L. F. Lepage. Secretary—Dr. J. A. Ross jr., Ste-Flavie Station.

SOCIÉTÉ MÉDICALE DES COMTÉS DE BEAUCE ET DORCHESTER :

President—Dr. Fortier. Secretary—Dr. L. M. Déchéne, Beaucheville.
Regular meetings, March, June, September, and December.

SOCIÉTÉ MÉDICALE DE ST-JEAN (IBERVILLE) :

President—Dr. Moreau. Secretary—Dr. Duval (St-Jean d'Iberville).

SOCIÉTÉ MÉDICALE DE ST-HYACINTHE :

President—Dr. J. C. S. Gauthier. Secretary—Dr. Viger, de St-Hyacinthe.

SOCIÉTÉ MÉDICALE DE SHEFFORD :

President—Dr. J. A. E. Brun. Secretary—Dr. A. Lessard, Granby, Co. de Shefford, P.Q.
Regular meetings twice a year.

SOCIÉTÉ MÉDICALE DE TROIS-RIVIÈRES :

President—Dr. DeBlois. Secretary—Dr. O. Darche, Trois-Rivières.

SOCIÉTÉ MÉDICALE DE VALLEYFIELD :

President—Dr. Ostigny. Secretary—

SOCIÉTÉ MÉDICALE DU COMTÉ DE CHAMPLAIN :

President—Dr. Trudel. Secretary—Dr. Bellemare, St-Narcisse.

SOCIÉTÉ MÉDICALE DU COMTÉ DE KAMOURASKA :

President—Dr. B. Vézina, St-Alexandre. Secretary—Dr. U. J.-I. Pajeau, de Ste-Anne.
Regular meetings, February, June, and October.

SOCIÉTÉ MÉDICALE DU COMTÉ DE MASKINONGÉ :

President—Dr. L. A. Plante. Secretary—Dr. DuHamel.

SOCIÉTÉ MÉDICALE DU COMTÉ DE TERREBONNE :

President—Dr. Grignon. Secretary—Dr. H. Prevost, St-Jérôme.

SOCIÉTÉ MÉDICALE DU COMTÉ DE WOLFE :

President—Dr. Thibault. Secretary—Dr. A. Pelletier, St-Camille.

Regular meetings, the first Tuesday of March, June, September, and December.

SOCIÉTÉ MÉDICALE DU DISTRICT D'OTTAWA :

President—Dr. Aubry. Secretary—Dr. J. E. D'Amour, Papineauville.